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The AUTOMOBILE

Vol. XXXVII
No. 23

NEW YORK, DECEMBER 6, 1917

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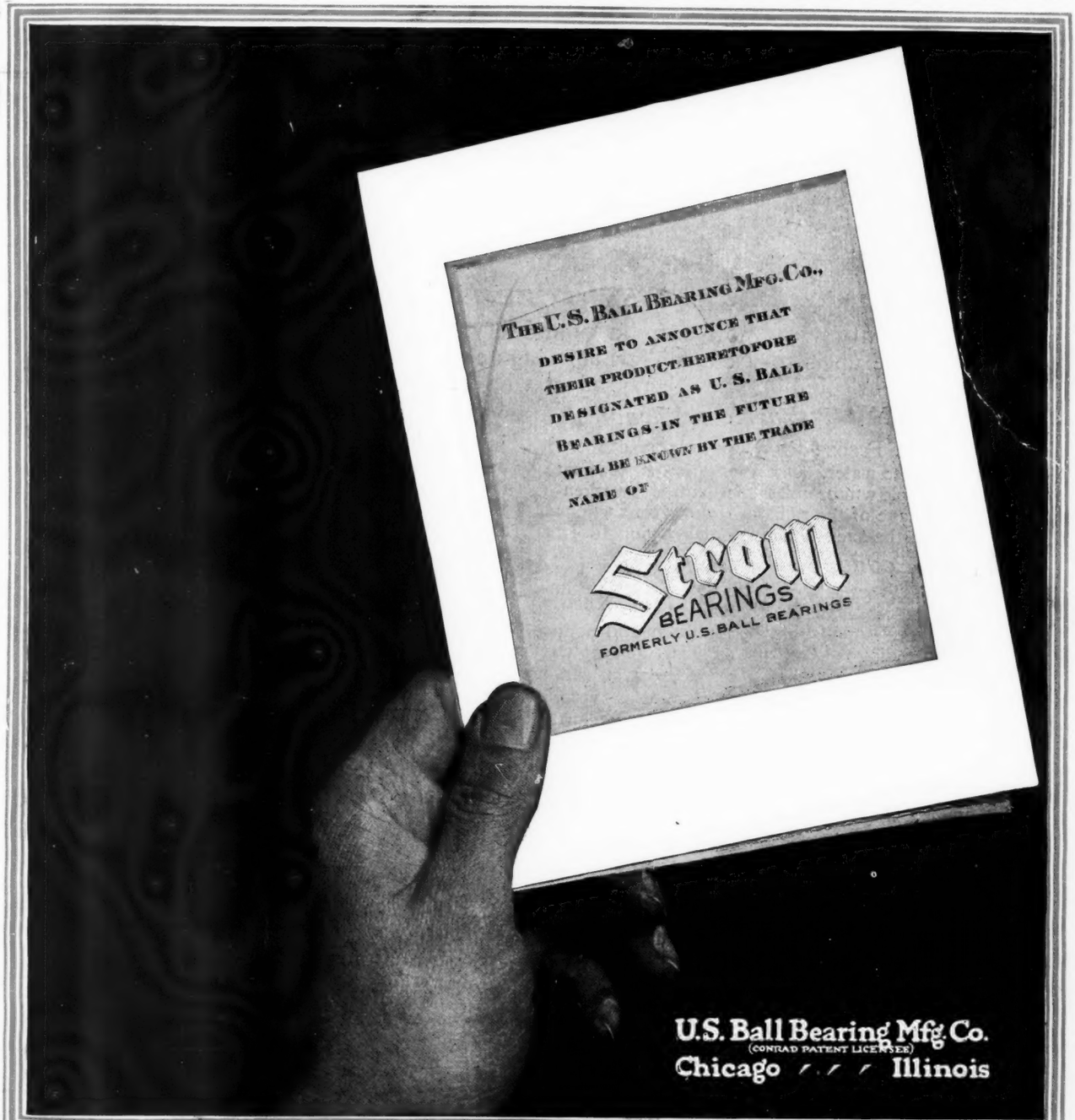

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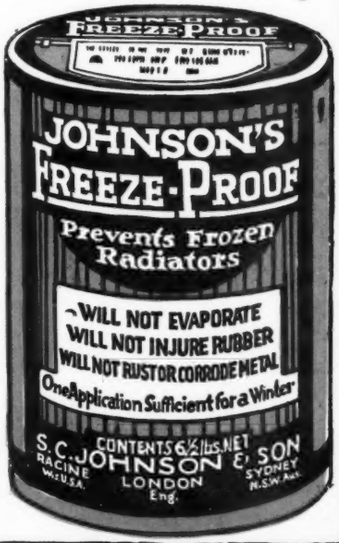

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AUTOMOTIVE INDUSTRIES
The AUTOMOBILE

VOL. XXXVII NEW YORK—THURSDAY, DECEMBER 6, 1917—CHICAGO NO. 23

No Enforced Curtailment of the Industry

"Non-Essential" Rumors All Groundless—Detroit Meeting Convinces Makers of Essential Aspect of Industry —Chalmers Makes Historic Speech

WASHINGTON, D. C., Dec. 5—A pronounced improvement with regard to the automobile industry has taken place not only in official Washington but also throughout the manufacturing centers during the past week.

Official Washington has at last come to a realization of the fact that there cannot be any drastic or specific curtailment of the industry, or in fact any industry, during the war.

Chalmers' Speech Creates Enthusiasm

The meeting of 150 automobile makers in Detroit last Friday has had a very salutary effect and much of the needless gloom of many makers has been dissipated. Hugh Chalmers of the Automobile Industries Committee carved a place for himself in the hall of automobile fame by his historic speech on the essential aspect of the industry and the fact that there would not be any legislative curtailment, that too many members of the industry were ready to throw up their hands when there was no necessity for any such action. Chalmers' speech turned a luke-warm meeting, permeated with pessimism, into one of enthusiasm. He performed a notable function for the industry by his notable speech. He deserves the thanks of the entire industry.

A further hopeful step from Washington is that the use of the word non-essential as too frequently used in and around Washington gives promise of an early cessation. It is now definitely known that many rumors which were given almost nation-wide circulation with regard to essential industries and priority orders had not legitimate ground for existence. They never emanated from any official source, but they carried so many earmarks of official messages that it was not surprising that they should have created much unrest. These are now happily set at rest, and it is hoped that no more such malicious rumors will gain circulation unless they are official.

Recently a report was published in practically every newspaper in the country to the effect that the President had himself signed an order naming 400 non-essential industries which would be curtailed "within one week." It was said that the industries would be given very short notice, and that "the names of the industries were closely guarded."

This story actually originated with a Washington newspaper reporter who first thought up the idea, visited an official at the Council of National Defense and placed the words in the official's mouth. This man later repeated the idea to others, and within ten hours it became a news item scattered far and wide. And this despite the fact that the President, having already delegated full priority orders to Judge Lovett, would never contemplate going over his head, while in addition there is actually no legislation or authority that permits direct discrimina-

tory curtailment of industries, though this can be accomplished by indirect means.

Another example of the cause for the recent hysteria is displayed in a story recently published in New York City conveying supposed Washington news, though carrying a New York date line, and telling that the Government contemplated through Judge Lovett certain severe and drastic freight facilities curtailment for many industries, and naming the automobile industry in particular.

How Rumors Originate

This story was a scheme formulated by certain railroads for the purpose of placing their wishes into the mouths of the Government officials. As Judge Lovett's immediate denial proved, the scheme failed. The railroads in question had desired to place an embargo on certain articles, including automobiles. They took the matter up with their legal advisers and were informed that it would be illegal discrimination. Then by means of the publicity they attempted to bring about through Government action the embargo they themselves could not enforce.

These are representative examples of the publicity that has produced the frequent mention of "drastic curtailment" and "non-essential industries." There will no doubt be more such publicity, and it should be disregarded. Government officials know how to treat it. Daniel Willard, chairman of the War Industries Board, a thorough business man and intensely patriotic, is above all things desirous only to perform his duties most efficiently to accomplish his share of the work toward military victory and to do so in the most sane and reasonable way.

No Curtailment Proposed

Instead of any curtailment the laws of supply and demand will largely, if not entirely, regulate. The multitudinous committees in Washington are now realizing that the quickest way to lose the war is to curtail industries. Last week one important committee man in the advisory committee of the Council of National Defense wanted to have considered a resolution relating to so-called non-essentials and luxuries, but he was quickly talked down by others present, showing what a complete change of heart with regard to such matters has taken place in the past week. It now seems certain that the days of hysteria are practically over.

There will be a safe, sane and steady course pursued by the Government which will insure immediate attention to the war needs, and also a constructive policy for all industry.

There will frequently be periods, sometimes for a day or week, other times for a month or three months, when certain industries, not so important to war as others, will suffer somewhat when an order demands freight car use for war transportation or a reduction of steel shipments to some plants in favor of others working on munitions, but none of these orders will be permanent and none will demand curtailment of a complete industry, and in all instances the industries suffering the temporary reduction of output because of emergency action will again, as soon as it is reasonable, be placed on a basis allowing normal conditions to resume.

These are statements based upon the actions and remarks of Government officials for the past week, and it is safe to assume their accuracy. They represent the opinions of Daniel Willard, chairman of the War Industrial Board; Walter S. Gifford, director of the Council of National Defense, and other officials of like importance, and they should be accepted generally and with complete disregard for the recent newspaper rumors which have been unofficial, injurious to the national interest and in many instances, as this column will show later, often the work of interests selfishly attempting to place in the Government's mouth their own personal aims and desires.

Fears of Manufacturers Unnecessary

Gifford, expressing himself with regard to the curtailment of industries and their classification as "non-essential," stated:

(a) The fears of manufacturers are unnecessary and that severe and drastic action in the case of so-called non-essential industries is not to be taken, and that if even a temporary curtailment is contemplated it will be brought about gradually and without harm to employers or employees.

(b) The Government looks to the public itself to curtail the manufacture of luxuries by reducing consumption of such materials.

(c) Supplies and transportation facilities allotments will be diverted gradually and usually temporarily to those fields most effective to war.

(d) The Government will work to obtain a safe middle course between the fallacious "business as usual" basis and the complete revolution of industry.

(e) No list of non-essential industries has been made or is even contemplated, as this would mean injury to financial credit, employees out of work, bankruptcies, and that foreign countries with which the United States must do business might demand many of the articles classified here as non-essential.

(f) The Government plans through the new bureau of manufacturing resources to inform all manufacturers whose businesses are not necessarily war industries how they can secure some war work to do along with their usual business and also what to expect regarding temporary curtailment because of materials, labor or transportation.

(g) The Government is co-operating with the United States Chamber of Commerce to secure a safe, sane and efficient industrial policy.

(f) THE COUNCIL OF NATIONAL DEFENSE, FINDING IT DIFFICULT TO DEFINE ANY INDUSTRY AS NON-ESSENTIAL, HAS DECIDED THAT NO ATTEMPT WILL BE MADE TO DO SO.

A Reasonable Course of Action

These statements, it will be quickly noted, tend directly toward a reasonable course of action. They show that the Government does not contemplate any such hysterical procedure as press reports would indicate. They prove that, following much of the

natural confusion that resulted here from the speedy organization and operation of the nation's war facilities, matters will readjust themselves to a logical basis.

The chief cause for the hysteria that has existed has been irresponsible and mischievous press reports. Automobile manufacturers and dealers throughout the country and the general public have been led to believe that the nation's safety demanded drastic curtailment of the industry, that victory in the war depended on transportation embargoes for such things as motor cars, that the automobile industry had already been classified as non-essential. All such reports as these have in the main emanated either from irresponsible newspaper reporters or from private companies seeking to further their own selfish ends.

Congress Expected to Influence Future Work

Other events here have temporarily slackened owing to the meeting of Congress, which opens this week, and which it is expected will have considerable influence on future movements.

The steel and iron manufacturers continue their demands here for Government orders on the plea that they are operating at less than normal capacity and that many of their plants will suffer disorganization of workers because of lack of work. In addition, many steel mills claim to be suffering a shortage of coal that is said to have cut production among certain mills to 50 per cent of normal.

New Council to Hold Weekly Meetings

The new War Council will hold meetings once each week, beginning to-day, and will attempt to coordinate all Government activities in the hope of eliminating conflicting and confusing orders.

Appointments of chairmen and members of various committees here still, in some instances, do not combine practical men with the positions. Last week an appointment was announced of an individual as chairman of a committee to investigate methods for transferring labor from one industry to another who, though theoretically fit, has not enjoyed the practical experience that should be possessed by one placed in charge of such work.

There are many excellent, experienced men in this country who would be particularly fitted for such duties; men who know labor thoroughly, who have superintended thousands of workers, reduced labor turnover, intensified the workers' contentment, know all the little details that will enter into the vast problem of the transfer of workers. Such individuals would be more likely to be successful with this very important war problem than a man versed only in the theory of the question.

Makers Pledge Support to Government

Hugh Chalmers, in Historic Speech, Harpoons "Non-Essential"—No Disruption of Industry

DETROIT, Nov. 30.—Hugh Chalmers, member of the Automobile Industries Committee, was the hero of the N. A. C. C. meeting, held at the Athletic Club here to-day when he declared that *he would not go back to Washington as a member of that committee with a resolution in his pocket that would allow the automobile industry, the third in the country, to be torn to pieces and legislated out of business.*

This action of Mr. Chalmers came when it was proposed that a resolution which amounted to turning over the entire industry to the disposition of the government was apparently under consideration and gaining favor from many present. As the meeting was not open to the press it is impossible to state exactly the conditions which existed when Mr. Chalmers rose to the occasion, made a historic hero of himself, and took a stand for the third industry in the country, which that industry greatly deserves.

Early Session Not Enthusiastic

Apparently the early stages of the meeting were not as enthusiastic as they should have been. There were 150 manufacturers of automobiles called together by the National Automobile Chamber of Commerce, and the members of the Automobile Industries Committee from Washington were present to review the Washington situation and to advise the manufacturers concerning the future of the industry.

The forenoon session broke up with matters in a very uncertain attitude. Several makers were uncertain as to whether they should be able to continue in business or not. The bigger men in the industry had not expressed themselves to any extent and there was noticeable gloom. For a time it looked as if manufacturers were going to leave the meeting literally whipped because they had not analyzed the situation as conditions demanded. There were many present who had not studied the subject. They had not read what had been published in their business papers. There were several who gave evidence of lacking backbone at a time when stamina was very much needed.

Chalmers Makes Whirlwind Speech

Hugh Chalmers took hold of the meeting at this particular crisis and through a whirlwind business-like talk turned a lukewarm meeting into an enthusiastic one.

"This is a time when there should be no pessimism. These are days when all industries must face problems, and when the heads of those industries must be prepared to honestly handle exigencies. The automobile industry is resourceful enough and its leaders are sufficiently capable to cope with any conditions that confront the industry."

In words to this effect Mr. Chalmers started his turning movement which resulted in completely changing the meeting.

As a result the manufacturers left in an optimistic frame of mind because Mr. Chalmers' speech had ana-

lyzed the situation for them. Many had this same viewpoint when they entered the meeting, because they had carefully analyzed the situation during the formative stages of the so-called curtailment movement in Washington, but unfortunately there were many present who were not as familiar as they should have been with the situation as it existed.

Mr. Chalmers referred to the people throughout the country who are dependent on the industry and to the cardinal necessity of keeping intact the manufacturing organizations of a nation in war, because by so keeping the industries intact they are able to serve the government better. It is a part of national prosperity to keep the industries healthy.

In line with information furnished by AUTOMOTIVE INDUSTRIES in its recent issues, it was clearly shown by Messrs. Copland, Chalmers and Lee, of the Automobile Industries Committee, that the Washington authorities have no intention of arbitrarily cutting off the automobile business. There is no necessity for curtailment regulations from Washington. There is no necessity for so much talk of non-essentials. The industry has been automatically curtailed in response to the law of demand.

Before the meeting was over a unanimous vote was taken pledging the support of the automobile manufacturers to the War Industries Board, and to the War and Navy Departments, and the following telegram was sent to Daniel Willard, chairman of the War Industries Board, at Washington:

"The automobile industry as represented by more than 150 manufacturers in session here to-day volunteers its hearty support to our Automobile Industries Committee in Washington, and pledges to the War Industries Board and the War and Naval Departments their heartiest support, and to a man expressed their willingness to turn their facilities over to the Government as fast as the Government can make use of them. In the meantime we hope to keep our organizations intact so as to conserve the greatest possible potential strength to the present and future war plans of the Government."

Rhode Island Registrations Analyzed by Makes

REGISTRATION figures from Rhode Island up to Sept. 10, 1917, show an increase of 4775 over the corresponding period of 1916. An analysis of that state's registrations shows that there were listed up to that date just 20,736 cars, not including trucks, or about one car to every twenty-eight persons. Rhode Island is among the leading states when its population and size are considered. Of the 4775 increase, Ford's gain was nearly one-half of that number.

Of the 225 different makes of cars registered, twelve leading makes cover about three-fourths of the cars registered. Ford stands far in the lead with 6866, a lead of 5458 over the Overland, which is second with 1408. Following Overland come Cadillac with 1287 and Buick with 1084. It is interesting to compare the order in the cars of Rhode Island and of the bordering states, Massachusetts and Connecticut. With two or three exceptions they run in very nearly the same order as they do in Rhode Island.

The Ford, with an increase of 2160, shows the greatest gain over last year. The nine next in order are Dodge, Chevrolet, Overland, Buick, Studebaker, Maxwell, Oldsmobile, Reo and Cadillac, showing the greatest increase to be under the $1,500 class, with the single exception of the Cadillac.

Ford	6866	Chandler	119	Simplex	41	Delauney	23	Speedwell	14
Overland	1408	Jeffery	119	King	41	Apperson	21	Michigan	13
Cadillac	1287	Oakland	114	Mercer	39	American	21	Herreshoff	13
Buick	1084	Winton	106	Kissel Kar	38	Case	20	Anderson	13
Studebaker	746	Stevens	104	Davis	38	Thomas	19	Cartercar	12
Reo	600	Regal	103	White	37	Warren	19	Port	12
Dodge	576	Locomobile	95	Jackson	37	Corbin	18	Little	12
Maxwell	566	Peerless	95	Knox	33	Columbia	18	Partin-Palmer	12
Packard	556	Marion	86	R. C. H.	34	Everitt	18	Special	11
Chalmers	454	Renault	79	Grant	33	Carnation	18	Abbott	10
Hudson	452	Stutz	78	Marmon	32	Lexington	18	Interstate	10
Chevrolet	419	Pope	74	Autocar	32	Pullman	18	Moon	10
Oldsmobile	356	Stearns-Knight	70	Allen	28	Selden	18	4 cars, 9 each	36
Hupmobile	333	Stanley	63	Imperial	26	Waverly	18	1 car, 8 each	8
Pierce-Arrow	317	Velie	61	Willys-Knight	25	E. M. F.	18	6 cars, 7 each	42
Paige	234	Dayton	64	Crow-Elkart	25	Lancia	17	7 cars, 6 each	42
Franklin	227	Auburn	60	Krit	25	S. G. V.	17	5 cars, 5 each	25
Metz	203	Fiat	59	Lozier	24	Empire	16	12 cars, 4 each	48
Saxon	188	National	56	Baker	24	Briscoe	15	14 cars, 3 each	42
Cole	151	Rambler	46	Lenox	24	Owen Magnetic	15	22 cars, 2 each	44
Scripps-Booth	147	Haynes	45	Mercedes	24	Biddle	15	54 cars, 1 each	54
Mitchell	146	Premier	45	Rolls-Royce	24	Palmer-Singer	14	Total	20,736

Recent Enemy Aircraft Types

ACCORDING to *Aeronautics* of London, the fighting scout mainly used by the Germans at present is the type D3 Albatross, engined with 170-hp. Benz. Her best flying speed is in the region of 125 m.p.h., her climb 20,000 ft. in 22 min. A 200-hp. Benz-Albatross is on the stocks, and will shortly make its appearance.

Meanwhile, it appears from a reliable French source that all is not well with the twin-engined Gotha. Its performance is certainly good—a ceiling of 20,000 ft. with fuel for 5 hr. and getting on for half-ton bombs—but the landing speed is most indifferent (as might have been expected) and is stated to be the cause of numerous accidents.

The bomber airplanes which the Germans have recently sent against England appear to be Gotha machines of a new type. They are said to be equipped with four Mercedes engines of 260 hp. each and carry fuel for 10 hr. Their crew is made up of five men—two pilots, two gunners and a captain, who controls the radio apparatus.

Motor Moneymaking

THE precise object of "The Story of the Automobile," by H. L. Barber (A. L. Munsen & Co.), is a little difficult to discover. It contains a brief historical survey of the history of automobile engineering and a similar account of the development of the industry. It is largely composed of the conventional panegyric of Henry Ford. Probably it will be seized upon by those whose business it is to sell stock in new firms by the method of pointing out what old firms have done, for it is simply packed with paragraphs which would fill this bill. Perhaps this is somewhat ungenerous an account of the volume, which is brightly written, and with which the man who "knows it all" can while away a pleasant half hour reminding himself of the recent past.

Many Repair Trucks for Ordnance

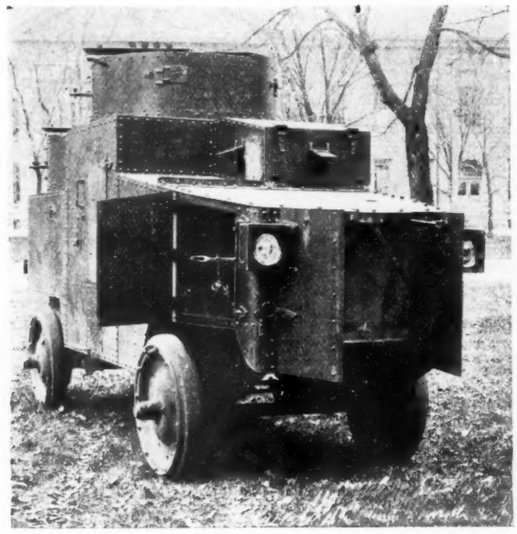
Maintenance of Guns, General Equipment and Tractors Calls for Large Mobile Repair Workshops—Big Depots to Be Established in France

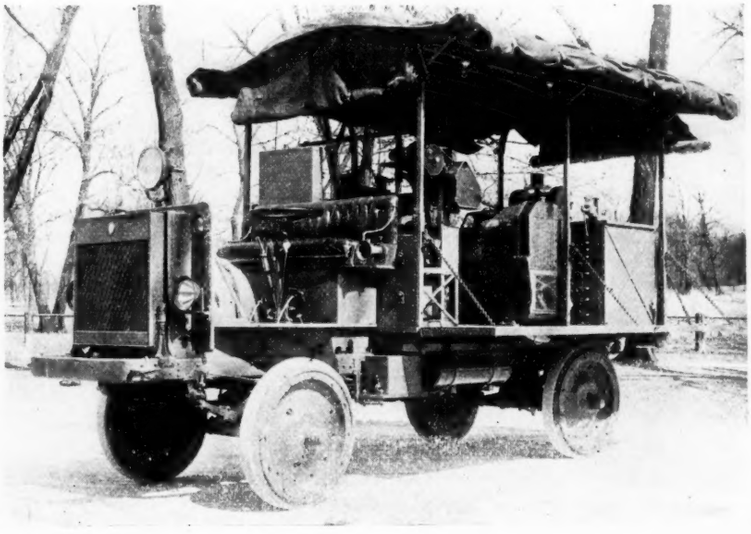
WASHINGTON, D. C., Dec. 3—The Ordnance Corps is making extensive preparations for the maintenance of trucks, gun carriages and tractors in France. Plans have been perfected for the erection of base repair depots at a cost of many millions, employing more than 15,000 mechanics, where efficient and complete factory systems will be installed.

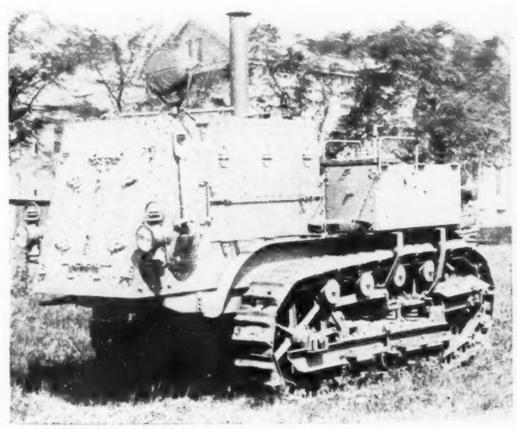
Mobile repair shops consisting of trucks carrying small complete repair shops, together with equipment repair trucks, general supply trucks and artillery supply trucks, will make up the numerous truck convoys that will operate close to the lines and make minor repairs.

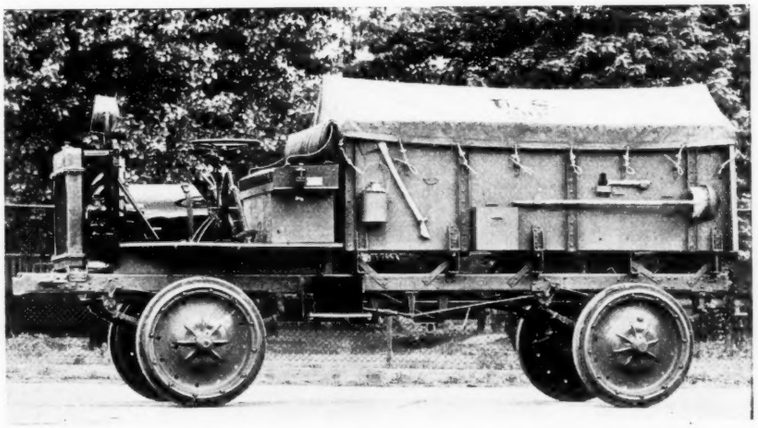
The equipment supply trucks carry small repair parts in specially constructed bins and several sewing machines for saddlery and clothing repair. This truck has a top operating on swivels to rise in the form of a canopy so that work can be undertaken regardless of weather and with ample space insured. The artillery supply trucks carrying extra gun carriage wheels and tools and parts will be ready for all repair work for light and heavy artillery. The general supply trucks carry the food, clothing, etc.

Each truck convoy comprising a unit will carry its complete personnel of officers and privates together with a cook. The men will be able to eat and sleep at any point and will frequently have opportunity to see action up in the front lines. The mobile truck, for example, will go to the aid of tractors that have broken down in the trench fields.









Types of vehicles used by the Ordnance Department. The armored car is mounted on a four-wheel driven chassis, as are the repair shop and the transport body for general purposes. The tractor is a small machine for gun hauling

Lancia Aero Engine Has Steel Cylinders

Cast Iron Cylinder Heads Containing the Valves Are Screwed Into the Cylinders and Sheet Metal Jackets Are Welded to Cylinders and Heads—Two-Point Ignition with Automatic Advance and Four Carbureters

A TWELVE-CYLINDER aviation engine produced at the Lancia plant in Turin, Italy, has recently been brought to this country and is on exhibition at the Lancia agency in New York. We understand that arrangements are being made to manufacture the engine in this country. The cylinders have a bore of 120 mm. and a stroke of 180 mm. (4.72 x 7.09 in.). This gives a cylinder displacement of 1490 cu. in. The power output is said to be 320 hp. at 1380 r.p.m., and the engine weighs 740 lb., or about 2.31 lb. per hp. With a piston speed of 1630 ft. per minute the brake mean effective pressure figures out to 122 lb. per sq. in.

Is a V Motor

The engine is of the usual V type, but the two sets of cylinders are set at an angle of 50 deg., instead of 60 deg., as in the ordinary twin six. This does not affect the balance, but makes the explosions come at slightly unequal intervals. The object in reducing the angle of V from 60 to 50 deg. is to reduce the over-all width of the engine, and consequently the air resistance of the fuselage or engine housing. The cylinders are made of steel and are machined both inside and out. The valves are located in the cylinder heads, which are iron castings and are screwed into the cylinders. The joint is a permanent one, however, as the jacket for both the cylinder and the head is made of sheet metal and autogenously welded to the cylinder and head. The bottom flange of the cylinders is also welded on, and a reinforcement extends a short distance up the cylinder from the flange. The valves are arranged with their axis in a plane perpendicular to the cylinder axis, and all of the valves of both sets of cylinders are operated from a single camshaft. This is driven from the crankshaft through a train of spur gearing with one intermediate gear. The valves are actuated by the cams through the intermediary of comparatively long rock levers of I section, with the web of the I drilled out for lightness. The upper ends of these rock levers are provided with set screws and locks therefor, for the purposes of adjustment. There are only two valves per cylinder, but these are of large dimensions. Closing of the valves is effected by coiled springs with a slight taper (volute springs), which bear against sheet metal washers at the cylinder, so as to protect them against the heat of the cylinder. The caps over the valve openings are provided with large cooling flanges and the spark plugs are screwed into these caps. The cylinder head castings are provided with lugs where the heads of adjacent cylinders abut, and these lugs are planed off and bolted together, so as to make the whole structure more rigid and minimize vibration of the cylinders in operation. Both the inlet and the outlet ports are on the upper side of the cylinder heads. Short lengths of steel pipe with their ends cut off at an angle are screwed into the exhaust ports. These pipes are bent so the major portion of them extends vertically upward. The inlet manifolds are of steel tubing and are water jacketed.

Aluminum alloy pistons are used, with three piston rings each, all above the piston pin. The connecting rods are made of drop forgings; they are of I section and have the web drilled in a similar way as the rock levers. The crankshaft, of course, is of the usual six throw type and is supported in three main bearings. Connecting rods of oppositely located cylinders connect to the crankpins side by side, the two sets of cylinders being slightly offset for the purpose. The crankcase is made of two castings of aluminum alloy and is divided in a horizontal plane through the axis of the crankshaft. The sub-base, however, is made of sheet steel, which is riveted to the aluminum casting forming the lower half of the crankcase. The crankcase bottom slopes from both ends toward the middle, and baffle plates are provided inside the crankcase to prevent all of the oil running toward one end when the plane is tilted.

Four Claudel-Lancia carbureters are used, each supplying three cylinders. Each carbureter has a barrel type throttle valve and a gasoline control, and the controls on all of the four carbureters are connected to a single operating device. The carbureters are located at the sides of the upper half of the crankcase and are secured to bosses on same by means of screws. Air is drawn into the carbureters through large funnels, which are covered with fine mesh wire gauze. Through the jackets surrounding the inlet manifolds some of the hot water from the engine jackets is circulated. There is a cross shaft at the front of the engine to which the throttle valves of all the carbureters connect. This is really a double concentric shaft, and the internal shaft may be used for connection to the gasoline adjustment valves.

Two-Point Ignition

Two point ignition is used, there being a spark plug in each valve cap. Current for ignition is supplied by two twelve-cylinder high tension magnetos of Dixie make. These are set on bases cast integral with the upper half of the crankcase at the forward end and are driven from the cam gear through a pair of spiral gears and a cross shaft. Each of the magnetos is provided with an automatic advance and is driven through a coupling which permits of its quick removal.

For lubrication two oil pumps are carried at the forward end of the engine. As far as can be made out they are of the sliding vane type and are driven through a pair of spiral gears and a cross shaft. These pumps draw their oil from the lowest part of the crank chamber, their inlets being covered by gauze strainers, and they deliver the oil through distribution pipes cast in the crank chamber and communicating with the main bearings of the crankshaft. The crankshaft is drilled with oil holes through which the oil flows to the crankpin bearings, whence it finds its way through small copper tubes running up the shanks of the connecting rods to the piston pin bearings. The pistons or cylinders are lubricated by the spray of oil thrown off by the crankshaft. Lubricant is also forced to the camshaft and rocker arm bearings.

The rocker arms are supported in sets of six in aluminum castings bolted to an upward extension of the base between the two sets of cylinders, and the rocker arms and supporting castings are interchangeable. The water circulating pump, which is of the centrifugal type, is located at the forward end of the engine, below the crankshaft, and driven by spur gears from the latter. It has a Y-shaped inlet and a single outlet connecting by a hose to a water distribution pipe cast in the upper half of the crankcase and extending on one side to the middle of the length thereof, where it debouches into a tube extending across the crankcase. From the ends of this tube there are short hose connections to the water manifolds at the bottom of the jackets. These water manifolds really consist of steel T's welded to the sheet metal jackets and short lengths of connecting hose. The water manifolds at the top of the jackets, through which the water returns to the radiator, are made of copper tubing.

A starting crank of the ratchet type is provided, but instead of engaging the end of the crankshaft it engages with the end of a countershaft which is geared to the crankshaft with a ratio of 4 to 1, thus facilitating the cranking of the engine.

Diluting Skilled Labor

Great Britain Overcame Labor Shortage by Utilizing Unskilled Men and Women to Maximum Extent—Skilled Men Kept to Skilled Work Only—Labor Agreed to New System for Insuring Maximum Production

By G. H. Baillie
Chief Technical Labor Dilution Officer, Labor Supply Department, British Ministry of Munitions

AT the request of Secretary of War Baker a deputation from the British Ministry of Munitions has been relating to groups of American business men how Great Britain handled the enormous labor problem which arose with the realization in 1914 *that England was hopelessly deficient in all munitions of war. Under the leadership of Sir Stephenson Kent the deputation first consulted with the Government and were then asked to tour the country so as to circulate widely the valuable information they possessed. This mission was not advisory, it merely came to tell a story and to answer questions. Speaking to the Editorial Conference, a body consisting of the editors of all America's leading business papers, in New York, Nov.* 13, *Sir Stephenson Kent gave a complete and concise summary of the British situation, which was printed in* AUTOMOTIVE INDUSTRIES *Nov.* 22. *There follow hereunder the addresses of Sir Stephenson's three colleagues.*—EDITOR.

Your chairman has asked me to give you some particulars of the schemes we have adopted to meet our shortage of labor, a shortage which has been the one factor in restricting our output of munitions from the beginning of the war till the present time. Our two schemes have been the dilution of skilled labor and the substitution of women for men. Both of those schemes were contrary to the trade union customs and practices as they were before the war, and we have been able to put them in practice only on the basis of the agreement between capital and labor, to which Sir Stephenson Kent referred.

One provision of that agreement was the abolition of all jurisdiction limits, and another provision had the effect of abolishing all trade union customs and practices during the period of the war. The whole agreement, however, referred to work on munitions only. Our employers made use of those agreements in various ways. First, an unskilled worker was brought into the plant to do an easy job. The man so displaced was put on the more skilled work, and the man displaced was again promoted, and so on until there had been an upgrading of skill throughout the whole shop.

How Unskilled Men Are Fitted Into Skilled Work

I might give you an instance of that process which occurred recently in a steel works in Wales. The works had put up some new furnaces, but the ministry was unable to supply either skilled men or unskilled men for the extension. The firm solved its problem by taking on sixty-seven women. The women, though, did not work the furnace. The process was this: The women took the place of laborers in the plant; they did loading and unloading and wheeling and transporting of material of all kinds and breaking up limestone, and generally all the laboring work in the plant that they could tackle. The men so displaced were put onto the simplest jobs in the works. They were made fourth-hand melters and mixers and those men were promoted to be third-hand melters and mixers, and so the grading-up process was continued on the old furnaces until a sufficient skilled staff had been obtained to work and man the new furnace.

Agreement as to Wages of Women

Another method adopted was to draw unskilled men from the non-essential trades, unskilled men who were either over military age or of low medical category. Watchmakers were brought into the tool rooms to do gage making. Our building industry was largely closed down and we took sanitary plumbers from there and trained them up to do lathe turning for our explosive factories. We also drew from the building industry carpenters and joiners and sent them into the shipyards to act as shipwrights and shipjoiners. We took mechanics, textile mechanics, from the textile industries, accustomed only to rough work, and trained them up to the better work of munitions. A third way was by confining the fully qualified mechanic to the highest forms of skilled work. If the mechanic normally had been on a job that could be split up into two or more parts of varying degrees of skill, the mechanic was confined to the part requiring the most skill, and we trained up men and women to do the lesser skilled parts. As an example of that process, I might mention the making of snap gages in the tool room. We commonly employ women to make, harden and grind the gages to within nearly their final limits, perhaps half a thousandth of an inch, and we confine the skilled mechanic to putting on the finishing touch.

Those schemes we called the "dilution of skilled labor," because we made the very little skill we possess go a very long way by diluting it with as much unskilled labor as possible. That dilution helped us to a great measure in dealing with our shortage of skilled labor, but before long practically all the useful men in the non-essential trades had either been drafted into the army or had gone into the munition plants, and to meet our continually increasing demands for munitions, we had to rely upon the women, and we adopted the scheme of employing women for every job which a woman could do or could be trained to do.

Now, I should refer to a condition which was attached to the agreement between capital and labor, a condition affecting the wages of women. It was agreed that a woman undertaking work which previously had been done

by a skilled mechanic should receive the same day rate as the skilled man; if she was on piece work, she was to receive the same piece rate. It was only when she was on unskilled or semi-skilled work that the woman's wage could differ from that of the man, and then her wage was regulated by an order which fixed a minimum wage, a wage, roughly speaking, two-thirds that of the unskilled man. Those wage conditions may not appear of great advantage to the employer, but indirectly they have proved extremely useful.

As a result of the good wages that women have been able to earn on munitions work, we have never been short of applicants for any kind of work, and our employment of women at present is limited only by our facilities for training them. In another respect, too, those conditions have been useful. They have had the effect of attracting to munitions work a good class of woman who has had a fairly good education, and we have found that she is capable of far better work and can more easily acquire skill than the type of woman that previously had been common in our textile and other factories employing women.

One Million Women Making Munitions

Our women have done very much more than anybody believed would have been possible. We have now on munitions work only over a million women. Every one realized that we should have no difficulty in introducing women on the simple repetition jobs of a light character, but since the Minister of Munitions began to urge the employment of women—and that was about two years ago —the development of their employment on munitions has been most striking, both in the extent to which machine shops are staffed by women and in the difficulty of the work on which they are engaged. Operating work on shell and fuses and grenades is obviously women's work, although two years ago twelve and fifteen-inch shells would have been regarded as on the heavy side for women, but now women are doing very much more than merely operating the machines. We have a shop on five-inch shells in which only six per cent of the hands are men; and in the machine shop all the tool setters and all the charge hands are women. And we have another shop on six-inch shells in which the proportion of skilled mechanics is one to every fifty women. I mention that shop because for output it is one of the best shops in the country.

Classes of Work Women Have Done Successfully

Taking shell and fuse and that class of munition work as a whole, on the average, about eighty per cent of the hands in the plants are women. And that is a very important result from the point of view of man-power.

And there is another class of munition work in which the same obtains. That is in the explosive manufacture and filling. In our largest explosive factory, making cordite, gun-cotton and certain other explosives, we have 15,000 hands, and of those 11,000 are women. On filling work, on the small shell, and on fuses and similar articles, we reach percentages well over ninety per cent, and on the larger shells the percentages are, of course, lower.

Coming to more highly skilled work, the percentage of women employed is, on the average, a good deal lower. But there are individual cases in which our percentages reach very high figures. We have a shop engaged on breach mechanism for howitzer guns in which every machine tool is operated by women who sit and grind their own tools, and the tools themselves are hardened and ground by women.

And, to take another example from tool-room work, we have women making screw gages, and the only skilled assistance they receive is that a toolmaker checks the setting of their chasing tools. For that class of work training is required. On the work I previously mentioned, the simple repetition work, we have found that no training, no special training, at least, is necessary. But the plants engaged on skilled work have found considerable difficulty in the earlier stages of the training of women.

Tool Works Train Their Women

Frequently they have but little work of a simple character on which the women can gradually acquire skill. And to meet that difficulty, the Minister of Munitions has equipped a number of training schools and constructional factories, which train the women and then supply them to the plants. In those training establishments we do not attempt to give any general instruction. The women do have a two weeks' course of general work, in which they are taught to use the foot rule and the micrometer, but then their training is specialized and they are taught to do a specific job on a specific type of machine. And in that way, by confining their work to quite narrow limits, we find that they can acquire considerable skill in from six to eight weeks' training.

But the larger proportion of the training has been done in the plants themselves, and we have had an interesting example of that in certain of our machine toolmakers. They have started schools in their own works in which they have trained women in the use of their own types of machine and then when they supply a machine to a customer, they are prepared to send with the machine as an item in the list of accessories one or two women who have been trained to use it.

And now a word as to the results of the women's work. In 1915 all our employers regarded the introduction of a woman into a machine shop as one of the horrors of war—about on a par with Zeppelin bombing and the shortage of sugar. Nothing has been more striking than the change of our employers' attitude toward women in the past two years.

If there is now a question between taking on a woman or an unskilled man, the employer has no hesitation at all.

Women Have Proved Their Place in Industries

The woman has been found to be a better and more conscientious worker than the unskilled man; at least, the type of unskilled man that is available in our country now. And the woman has been found better able to acquire skill rapidly. On skilled work, when it is a comparison between a woman and a fully qualified mechanic, one cannot, of course, expect the woman to be so valuable an asset as a man who has been four or five years at his trade. But now the only skilled men we can scrape out of the less important munition factories are of so poor a quality that it is not uncommon for an employer who requires extra staff to take on women and train them himself rather than apply to the Minister of Munitions for the poor quality of man that he knows is all he will be able to get.

I am afraid, gentlemen, that these results of our experience may seem rather far off for conditions now obtaining in your country. But in England the difficulties of the shortage of labor came upon us very suddenly and unexpectedly; and I believe that you are no better off for skilled men than we were at the outbreak of war, because you have adopted the policy of the unskilled operative to a far greater extent than we did in England. And I believe that you will in a question of a few months find yourselves following our experience and faced with a serious labor shortage; and then I hope that the results of our experience may prove of some service to you.

How Great Britain Supplies Skilled Men to Army—How Trade Disputes Are Regulated

By Captain Cyril Asquith, Director of the Artificers' Allocation of the Labor Supply Department, and H. W. Garrod, Deputy Assistant Secretary of Labor Regulation Department, British Ministry of Munitions

I WILL endeavor to say a few words about the specific work which in the Ministry of Munitions it is my duty to discharge. That work consists in the provision of skilled artificers for service in the technical branches of the army and navy.

Artificer is a name we have in the army for skilled men. It is nothing more nor less than a skilled machinist. I think it would probably surprise you to know how large those demands are. The technical branches of the army—that is to say, like the Army Corps, Royal Flying Corps, Royal Engineers, and so on and so forth—comprise altogether about half the total number of the armies. I don't say those corps consist wholly of skilled men, but they consist of skilled men to a greater or to a lesser extent.

Army Needs Thousands of Skilled Machinists

Just to give you some notion of the magnitude of the demands which they make, I may mention that as we left England a demand was presented by the War Office for 40,000 skilled men to work on the railways behind the lines in France, and that about three or four weeks ago we heard that a further demand for 15,000 highly skilled machinists had been presented.

We are embarrassed in our attempts to meet those demands by the fact that in common with practically every other European power, we made the mistake in the first year of the war of permitting the enlistment in infantry and other regiments of highly skilled machinists who would have been much better employed either in civil life upon munitions or in these technical branches of the army to which I refer.

Now, those men have in very many cases been killed or disabled or taken prisoner, or they have been simply lost, can't be traced, or for one reason or another they can't be made available. But, nevertheless, we do attempt to meet these big demands, so far as possible, by pointing out to the war office any skilled men in infantry whose whereabouts, whose unit we have been able to trace, and recommend the War Office to transfer them to a technical branch of the army. The only other source from which we can hope to meet the War Office demands is skilled men already working on munitions of war in civil life.

Skilled Men Lost by Early Mistakes

Of course, it will be readily understood that the utmost caution and reserve has to be observed in withdrawing such men. If they are withdrawn from the more important plants or from the more important classes of work, output suffers correspondingly, and we can't afford that output should suffer. Nevertheless, the greater the output is of munitions of war, the greater the number required of these very skilled artificers who are needed to maintain them in repair at the front. So we live in a rather vicious circle. But we attempt as best we can, from those two sources—the skilled men in infantry and civil men working in civil life—to meet the demands which are presented to us. As I say, our great difficulty has sprung from the mistake we made in allowing the skilled men to enlist in units where their skill could not be employed.

H. W. Garrod's Address

The chairman suggested that I should say something upon our method of dealing in England with trade disputes. I can do that briefly.

We haven't got a method, and there is no method. If there is a method, it is part of the larger method of trying to make truth and justice in the Kingdom of Heaven prevail. However, I can say, I think profitably, just one or two words upon results.

We have had, in all, only three labor disputes since the war began which could be called serious. One of those lasted, I think, ten days, and neither of the other two lasted as much as a week. They were serious to us. They might not be thought serious elsewhere.

Secondly, since the war began we have had no dispute at all—no strike, I mean—in Great Britain which has arisen out of a demand for higher wages.

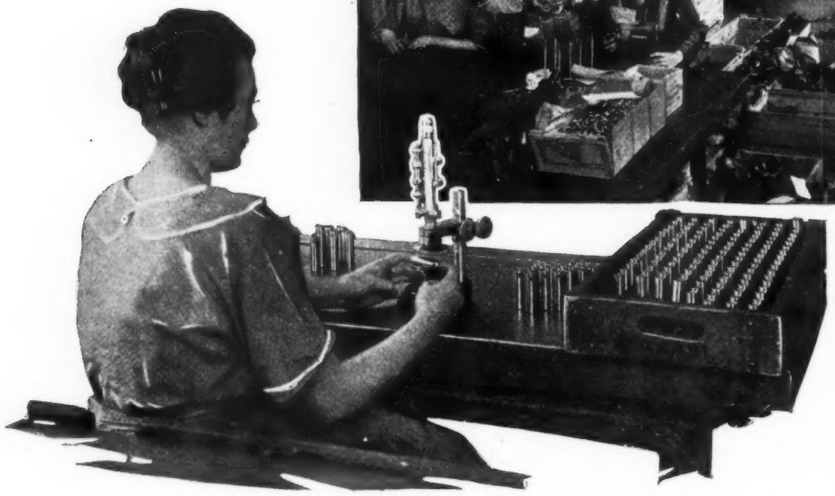
Thirdly, and I think equally striking, we have had no dispute at all in which the responsible officials of the trade unions have not stood loyally by the government and against their men. They might have bargained when we first passed our Munitions of War Act—they might have made a bargain with the government that there should be no strikes, and in every instance they have used all the influence that they possessed at crises, in order to keep the peace. (Applause.)

Men Revolt Against Union Officials

I'd even go a little further and I'd say that in the three serious disputes which I referred to just now, and in the great majority of the lesser disputes which have occurred, I don't believe that the rank and file, the men as a whole have been behind the strike that occurred. In the three instances which I mentioned, at any rate, the work was done, I am fully convinced, after trying to think over the thing impartially, ultimately, that bad work, by a small band in each case of trade union officials, local officials, who were in revolt, not against the government, but against the central officials of their own union, and who were also deeply tinged with pacifism.

I will just add one other word, if I may, which I hope won't be taken as being anything in the nature of advice or criticism. Since we have been in this country, a period now of nearly ten weeks, we have been witnesses from a distance of a very considerable number of trade disputes which have been, so far as we could judge, serious, and, in some cases, prolonged. But what I want to say is that if one-eighth—I think that is no exaggeration—of the industrial troubles which we have witnessed in this country in the past two months had taken place in England, over the whole period of the past two years, we should long ago have been compelled in England to sue for disgraceful peace. That, I think, gentlemen, is a serious and solemnizing reflection, and I want to leave it to you without comment. (Applause.)

Women in Industry



FOLLOWING the European habit the Packard Motor Car Co. is preparing to employ women extensively in the manufacture of trucks and airplane motors. The view below shows a bay in the semi-automatic department which is entirely operated by women. Above are shown inspection and gaging. The girl seated at the table is using a fluid gage and it is found that very accurate inspection results from the employment of this instrument, which is simpler to use than a micrometer.

It is stated the Packard company finds the work of its female employees highly meritorious and the company will not hesitate to increase the proportion of women in its force as changing labor conditions and factory readjustments demand.

Undoubtedly similar procedure will become necessary in other plants if the war continues as long as is expected, and thus the experience of the Packard company should be studied by other manufacturers. In this plant women are at present engaged only on work of a reasonably light character, although foreign experiments show that female employees are able to do nearly all the work of men.

Automobile Trade With Argentina

American Car Has Changed the Nature of Demand—Great Need for Motor Transportation in Argentina Causes Demand for Moderate Price Cars —Must Send Ample Spare Parts with Shipments of Cars

WASHINGTON, Dec. 4—The Bureau of Foreign and Domestic Commerce has just published a report on automobile conditions in Argentina by David Beecroft, directing editor of AUTOMOTIVE INDUSTRIES, who made a special investigation of conditions in that country a year ago. The report deals comprehensively with the physical conditions of the country, the industries and general factors that have an influence on the sale of automobiles. A goodly portion of the report is given over to a concise analysis of Argentine customs as related to the automobile industry; and there is also much practical information for the general guidance of shippers.

One of the major factors in the report is the broadening of the field of automobile sales in Argentina by the advent of the American car, as previous to its advent the expensive European cars sold very largely in the cities, but the American car arrived at a time when city sales were slackened and the farming communities were the only field. European makers had never considered the country trade worth going after. The great success of the American car has been its ability to perform in the great agricultural areas, notwithstanding the absence of good roads and the poor attention the automobile receives at the hands of the Argentine.

One essential to the success of American sales in Argentina that is emphasized by Mr. Beecroft is the necessity of an ample supply of spare parts being carried in Argentina, and preferably in Buenos Aires. As that city is 22 days by boat from New York, it often requires over a month from the time a spare leaves the factory in America until it arrives at its destination in Argentina. This means the laying up of the automobile for perhaps two months or even three months unless the spare is cabled for, which cable might cost more than the spare itself. The Argentine, before buying an American car, asks the one essential question as to the supply of spares that will be carried, and very generally he refuses to make a purchase until he has been actually shown the quota of spares carried in the Argentine capital.

Good Literature Needed

The necessity for instruction books printed as well as well-illustrated catalogs also in Spanish is well emphasized. There is also great necessity for good posters and other literature. The necessity of advertising copy being written in Argentina rather than in North America is dwelt upon.

The possibility of truck sales not only in the cities but also with the large farmers or estancerios offers one of the big attractions for American manufacturers at the present time.

In his report Mr. Beecroft covers the field very generally, and the following extracts give a few sidelights on some of the most important aspects of the Argentine field as it appeals to a North American:

"The physical characteristics of the country, with its prairielike pampas, ideal for agriculture, its population of 8,000,000 scattered over an area greater than that of the United States east of the Mississippi River, and its great need for motor transportation of all types make the country a particularly opportune field for such apparatus. Like the great Mississippi Valley in North America, Argentina will undoubtedly develop into the largest consumer of motor vehicles in South America.

"Previous to 1911," says the report, "automobiles imported into Argentina came largely from Europe. The number of cars imported into Argentina during the last six years was as follows: 1911, 2461; 1912, 4281; 1913, 5115; 1914, 2185; 1915, 1847; 1916, 5929. Argentina was importing automobiles from Europe as early as from the United States. Each year saw many Argentine citizens spending the winters in Paris, London and Berlin, where they lived at the finest hotels, purchased the finest motor cars, and naturally attracted the attention of the entire European automobile industry to their country. The importation of European automobiles into Argentina reached its zenith in 1911, the year of the crisis. Since that time sales of the expensive European car have fallen, and to-day there are unsold cars that dealers have been carrying for years. These cars are now obsolete models, and many dealers will have difficulty in getting their original investment out of them. It was this stock of high-priced European cars that held back the American car, and that is still holding back to some extent the sale of American cars in the cities.

Motoring Mostly in Cities

"For 10 or 15 years previous to the war automobiles in Argentina were confined chiefly to the cities, such as Buenos Aires, Rosario, Bahia Blanca, Mendoza, Cordoba, La Plata, Sante Fe and Tucuman. The European cars sold almost exclusively in the cities. The American car to-day is selling almost exclusively in the country. European cars were largely of the expensive types in all the best makes. They were owned by the wealthy business men as well as the wealthy estancieros (farmers), who spent much of their time in the cities. The country districts, being practically without improved roads, were not suitable for such automobiles. In fact, it was very rare that a resident of Buenos Aires would attempt to drive even to Rosario, a distance of 175 miles. In dry weather such a drive might be possible, but it would be very unpleasant because of the trail-like roads and the clouds of dust. In wet weather the trip is impossible, for the heavy cars could not make any progress over the black soil roads. With few exceptions, the expensive European automobile was a city vehicle for the wealthy classes.

"The advent of the American car in quantities introduced a new order of motor. The cheap American car did not appeal to the wealthy citizen. He considered the United States capable of manufacturing farm implements, railroad cars and heavy hardware, but not of producing the luxurious and scientific automobile. He refused to buy the American car. American manufacturers who confined their selling activities in Argentina to the cities met with very limited response.

"Almost simultaneously with the war a change came about in the representation of American automobiles in Argentina. Selling activities formerly confined to the cities were transferred to the country. Pioneer American salesmen started across the pampas with their demonstrating automobiles. They proved that the American car is a practical machine for those endless level stretches of fertile farming land. They proved that the virgin trails over which 10 to 20 horses slowly pulled the huge farm cart with its 6 to 12-ft. wheels could be traveled by the American car. The salesman demonstrated to the estanciero. At first he was opposed to the car. It was impractical in the country; it did not coincide with his conceptions of a car; and it would not last. A few demonstrations proved otherwise. The car was driven over every part of the estancia. It was sold to the estanciero and to his family as well. This selling campaign spread from one part of the pampas to another until it permeated every

(*Continued on page 1030*)

Samson Tractor Is Dirtproof

Inclosure of Every Part and Dust Extractor Protects Mechanism—Accessibility Studied—Is Very Low Built

THE Samson tractor was developed for a period of 16 years on the Western Coast, the first unit being built in 1902 and since that time it has been developed along a definite line with the present model, soon to be produced by the General Motors Corp. of Pontiac, Mich., a direct culmination of that development. The present type is a three-wheeled unit with two 40-in. rear wheels and a 28-in. front wheel. The frame is A-shaped with a pronounced drop at the forward end, so that the machine is very low comparatively.

The leading specifications of the tractor show it to be in a great many ways similar to the automobile types of machine that have lately come into vogue. At the same time it has a number of departures from automobile practice which show it to be an individually developed machine rather than an adaptation of motor-car design. The construction of the frame is distinctive and altogether different from anything used in automobile practice. At the forward end of the frame forming the apex of the A-shaped piece, the frame kicks up high enough to form a bearing for the pivot in which rests the upper end of the forked yoke carrying the front wheel.

Engine Base and Crankcase One

Just behind this bearing point the frame drops down and is carried back close to the ground, forming the side-supporting member for the power plant and also the support for the transmission members and the dead rear axle which is a part of the internal drive suspension method.

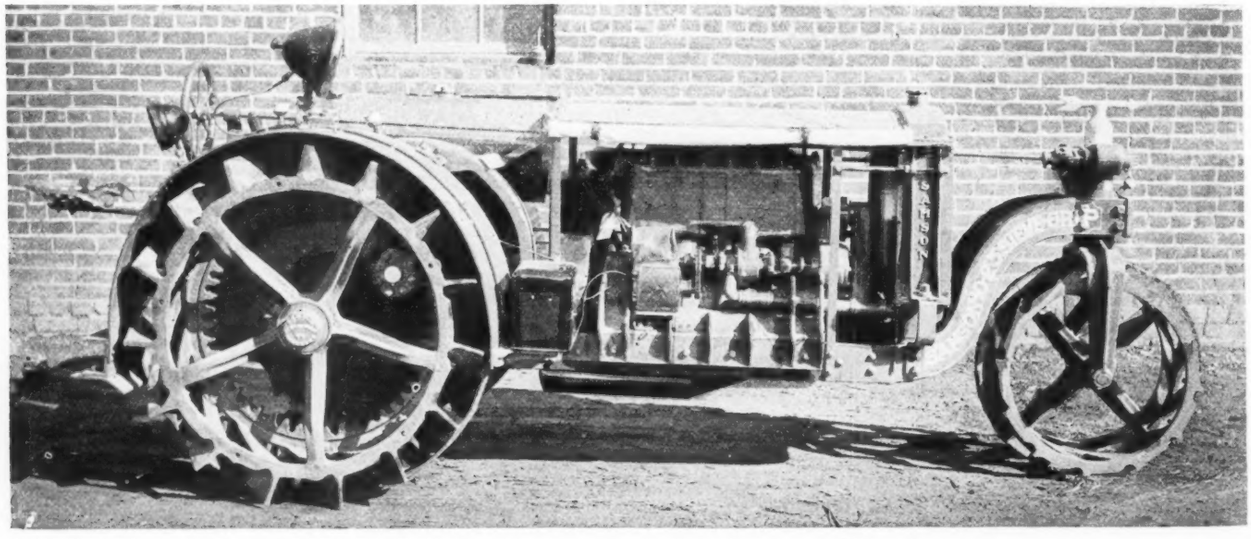
A unique feature in the construction of the power plant is that the engine base and the crankcase are all one. This part is a rigid casting with two large, side hand holes allowing the repairman to reach any of the main bearings or any of the lower rod bearings without trouble. There is a flange running the entire length of the engine base casting which forms the supporting member of the engine. This is different entirely from the three-point suspension generally used for tractor purposes on the power plant, but the requirements for flexibility are met in a different way by having the frame itself supported at three points. With this arrangement rigid connection of the engine to the frame is secured without the objection of having the crankcase weave when the tractor travels over rough ground.

The engine is a four-cylinder, block type, having a bore of 4¼ in. and a stroke of 6¾ in. The valves are on the left, and the design is conventional throughout, the type of construction being a detachable head style. The engine is cooled by centrifugal pump with a front fan, and the radiator is a fin tube vertical type with a semi-steel case having the tubes set in sheet brass.

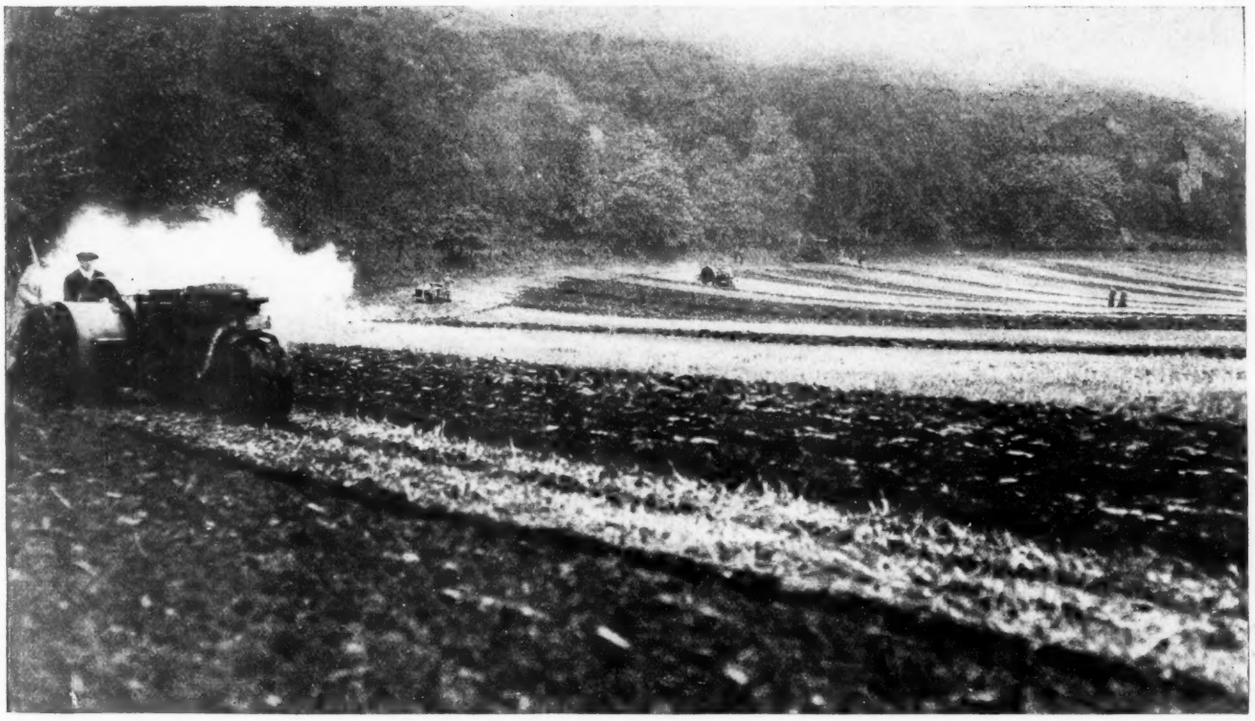
Single Ignition Employed

Single ignition is used, the source of current being a high-tension Eisemann, waterproof, Model G-4 magneto with fixed spark. No lighting or starting systems are supplied as stock, but for night work it is easy to mount spotlights. The governor is a loose revolving-ball type driven from the engine and made by the G. M. C. Samson concern. It holds the speed to 900 r.p.m., which gives a tractor speed of 2.25 m.p.h. Fuel is fed by gravity through a Marvel Model E carbureter from a gravity tank located on top, over the center of the tractor. Lubrication is by circulating splash with a gear pump delivering oil to a trough above each bearing and supplying oil for the connecting-rod dippers.

The drive is taken by means of an expanding shoe type of clutch, faced with Raybestos through a constant mesh gearbox giving one forward and one reverse speed.



Side view of three-wheeled Samson tractor. Note accessibility of engine



The first day's ground near Edinburgh with a Samson tractor in the foreground

All Tractors Do Well in Scotch Trials

British Comment Votes Plow Design Behind Tractor Engineering — Ability to Work on Hilly Ground Amply Demonstrated—Wallis Cub Plows an Acre on Two Gallons of Kerosene

IF we take the main object of the whole series of trials to be (as in fact it was) a demonstration of motor plowing, one fact stands out pre-eminent, and this is that, at the present stage of tractor evolution, motor plowing is, if anything, more a matter of the plow and its setting than of the tractor. Given a load adjusted to the machine and the conditions, an adequate drawbar pull can be assured. Every machine participating proved that, and the reliability and working speed of the tractors scored a big success.

Conditions Poor

Such is the comment made by the British paper *Motor Traction* in summing up the results of the tractor trials held in Scotland at the end of October. The soil was heavy, the ground was hilly, the weather was cold and damp. Much of the plowing was done on fields which had been grass for fifty years. There were some troubles, of course, but according to the reports these were much more frequently due to the plows than to the tractors.

A comment made that has strong application to nearly all of Great Britain, but much less to America, is that plows are not easily set to suit changes in the nature of the plowing. For example, it may easily be necessary to plow a couple of acres of which some is flat, some 10 per cent or more uphill and some downhill. It is not possible to handle the grade with the same number of bottoms which can be pulled on the level, and it is uneconomical to attach say three bottoms which will suit the grade and dispense with a fourth which could easily be pulled on the level. It is pointed out that farmers do not expect horses to do the same work on hills as on the level but that they seem to think the tractor should be unaffected by grades, which is, of course, absurd. It is noteworthy that there is little said in the British reports on the ability of the different machines to handle kerosene. Apparently they manage better on the export brand of fuel than on the home market variety. This is in accordance with expectations, because the fuel called paraffin in England, which corresponds to kerosene for illuminating purposes, used to be a much cleaner liquid. Probably the fuel actually being used for British tractor plowing is the equivalent of American kerosene mixed with 25 per cent gasoline. No official figures of fuel consumed are available as yet, but it is known that the Wallis cub plowed just under an acre at a fuel rate of $2\frac{1}{2}$ gallons per acre plus some starting gasoline, the depth of furrow being $7\frac{1}{2}$ in.

British Machines

The great majority of the machines were American, but there were a few British tractors, mainly quite small. Apparently the best engineering job is the Alldays, which several foreign magazines have commended most highly, with the reservation that the price is very high. It has several distinctive features. First, it is designed with road hauling in view as well as

The four-cylinder Fowler and two-cylinder Wyles tractor plows made under the same patents

farm work proper, and since this necessitates the provision of springs in order to conform with English law, a flexible suspension is provided. Springs, however, are considered undesirable for plowing, so a lock is fitted whereby spring action can be stopped.

Another feature is the ballast tank over the rear end, which holds 1200 lb. of water, and is intended for use when the conditions demand more grip than obtainable with the unballasted tractor. The steering is peculiar, since it is Ackerman type, and yet is unconventional. The swivel axles are attached to a forged axle which is sprung on coil springs working in brackets depending from either side of the frame, these holding the axle firmly. Instead of the customary tie rod and drag link the swivel arms are connected by a chain which is wrapped around a drum mounted on the end of the steering column. There are actually two chains working in opposite directions.

There are three forward speeds, 5 m.p.h. being the maximum, with a 2¼ plowing speed and a 1¾ emergency gear. From the gearset, which has sliding gears, a massive chain drive goes to the differential on a live rear axle provided with a manual differential lock. In this respect, as in some others, the makers have borrowed largely from accepted British practice in the steam-truck field. The engine is a regular four-cylinder truck motor, rated at 40 hp. It uses kerosene (British paraffin) through a Zenith carbureter, the vaporizing system being a mere coiling of the fuel line around the exhaust pipe close to the carbureter.

An Agricultural Type

Another British machine, the Saunderson, is one of the oldest internal-combustion tractors. It is essentially an agricultural implement makers' type, with engine placed high up on a frame akin to the old steam-tractor style. The engine is transverse, and drives partly through exposed gearing to large rear wheels. The two front wheels are mounted on a central pivot and steered with chains.

A new British machine which is well spoken of is the Weeks Dungey. Its outstanding feature is its remarkably short length, and is claimed to be especially suitable for the close planted European orchards or for hop plantations, turning with a very short lock. It is rated at 22½ hp., with a regular automobile-type engine, and has three forward speeds. For road work it is

Above, the Martin, a creeper drive British machine, and below, the Killen Strait

arranged so that solid rubber tires can be attached.

Probably one of the smallest tractors in the world is the Fowler, another British make. This has the plow as an integral part, and is balanced on two wheels, being steered from behind, very much like a team. The operator can either walk or sit on a seat above the plows. There is a small two-cylinder vertical engine mounted at the extreme front and some 2 ft. ahead of the axle. It is stated to have pulled two plows 7 in. deep and cut 9 in. wide at a steady 2 m.p.h. in the trials.

The only steam tractor which appeared was the Mann, a product of an old manufacturer of steam tractors for road hauling and of steam trucks. It is a well made and neatly designed machine, using coke as fuel, and its consumption when plowing is said to be between 150 and 200 lb. per acre.

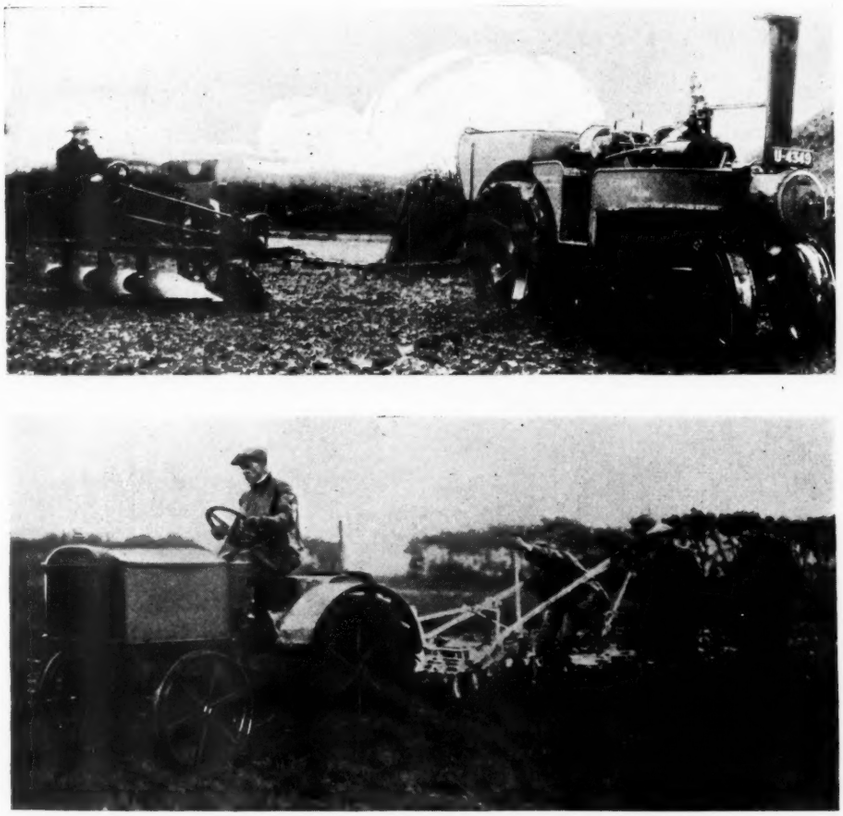
Above—The Saunderson, one of the oldest British tractors. Below—An American Overtime in the Scotch trials

British Machines Peculiar

On the whole, it seems that the British machines are nearly all unconventional. The desire to provide for road hauling as well as plowing is a severe handicap, because English law prohibits the use of driving lugs on roads and also insists upon springs and a complete double set of brakes. On the other hand, such machines as the Wyles and Fowler, which are apparently good for nothing but field work, are attempts to carry out the "integral" idea. Judging from reports, the fundamental principle of the Moline Universal is regarded very favorably by the British farmer, and the Wyles and Fowler are a kind of junior imitation of this. Otherwise, the four-plow cutfits seem most in demand, the Wallis and the Cleveland obtaining a great deal of publicity.

Of course, development in England is held back by the innumerable restrictions of material and labor, and in this connection an editorial comment from *Motor Traction* is instructive. Our contemporary says:

"It is a matter for regret that a number of our leading British agricultural engineering firms have not been able to enter farm tractors or motor plows, more particularly as the preponderating majority of the machines entered were not of native manufacture. We believe that in the main those who are best acquainted with the requirements of British agriculturists, and who know most about the conditions under which machinery of this kind has got to work, are the best equipped for producing the required implements, both for power and cultivation. This raises the question whether or not these firms should be turned on to the production of farm tractors so as to contribute as far as possible to the increase of cropping which we hope for next year. The matter is, however, one which the government has got to decide with all the facts and requirements of the country before it; but we do hope, from the point of view of an important British industry, that these concerns will not be kept a day longer than is necessary from the work for which they are preeminently suitable.



Above—The Mann steamer. Note water-ballast tank. Below—The Weeks Dungey, noted for its short wheelbase

Graphs Show Cost of Plowing

Quick Method of Comparing Cost of Work with Different Sizes of Tractor and Different Depths of Plowing on Average Soil—Includes All Expenses

By E. Goldberger

A COUPLE of years ago a study of the cost of plowing would not have been of any practical value, since the conclusions, even though they might have been drawn in the most logical way, would have been based upon theoretical assumptions; hence, the conclusions, too, would have been theoretical.

During the last years the line of tractors has been extended till now we have on the market practically any size of tractor ranging from 10 up to 120 hp., and from their performance and prices and being acquainted with the requirement on the farm and the manufacturing problems, *i.e.*, all the premises being known facts, it is possible not only to draw correct conclusions referring to the present conditions, but also, what from a business standpoint is more important, to anticipate the future development.

Many students of this problem will undoubtedly say conditions on the farms are so different as to quality of soil, size of farm, kind of crop and hundreds of other things that considering everything that enters into the problem, a general and intelligent solution of it is precluded, while without taking everything into consideration the solution cannot be correct. That is, at least, as it appeared to me a couple of years ago, but I have changed my mind in the meantime.

One way of attacking the problem is by having every tractor owner state the size of tractor and farm he has got, perhaps also the size he thinks would suit him better, and draw the conclusion according to the law of averages. The Department of Agriculture has published in book form the results of such an investigation directed by A. P. Yerkes, and it is of interest to note that although following different methods, the results of the survey agree with the conclusions which follow the thought of this study.

I shall consider in the following three sizes of tractor that would be built along exactly the same standards of quality, design and workmanship:

A—Capable of pulling two 14-in. plows, 6 in. deep, in average soil, at a speed of 2½ m.p.h. This would require about 9 hp. on the drawbar.

B—Same quality tractor, of double size, pulling four 14-in. plows, 6 in. deep in the same soil, 2½ m.p.h. speed. Drawbar of 18 hp.

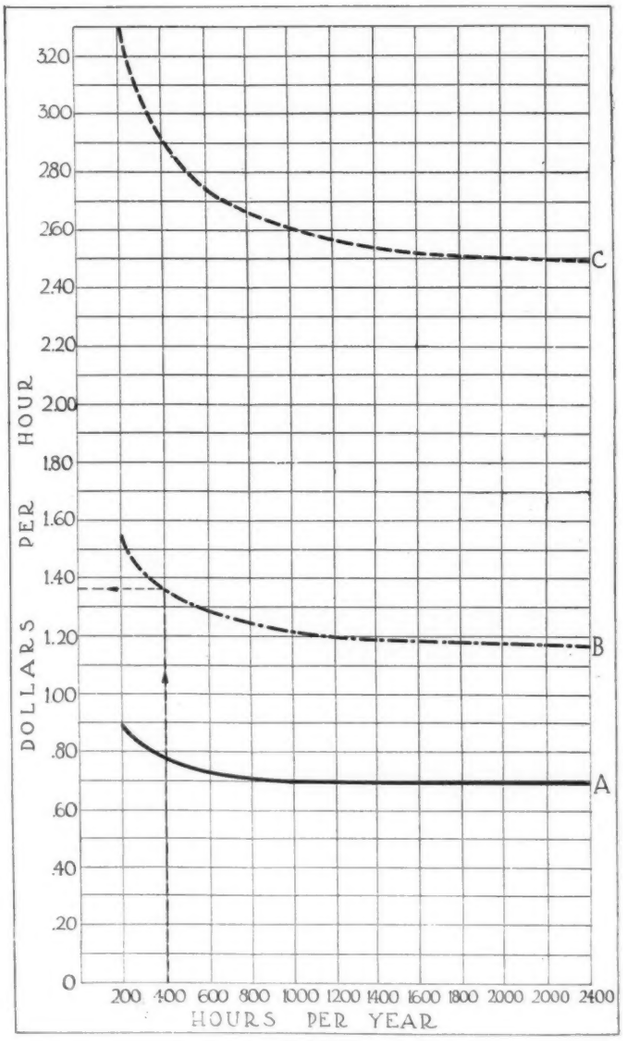
C—Twice as strong as B, pulling eight 14-in. plows, 6 in. deep in the same soil, 2½ m.p.h.. Drawbar 36 hp.

Price Considerations

Since there is to-day no doubt in the mind of anybody familiar with the tractor problems that the really successful tractors are and have to be built according to the standards of quality adopted by the truck manufacturers and not those of country blacksmiths, I shall estimate the prices as follows:

Tractor A, $600; Tractor B, $1,500; Tractor C, $3,600.

The price for tractor A, if the design, material and workmanship be first class, cannot be reached unless quantity-production methods are adopted. For 100 per cent increase in size the price increases 150 per cent in the above estimates, since I make the preliminary assumption that with the size of tractor increasing, the demand might decrease and the manufacturing methods to be adopted become more expensive.



GRAPH 1

Cost of plowing per hour with varying number of plowing hours per year. A, B and C represent cost with a 2, 4 or 8 plow tractor respectively. If you know the number of hours of plowing per year, read it on the horizontal co-ordinate, follow the vertical line through this point to the point of intersection with A, B or C curve and read the cost in dollars per hour on the vertical scale

I shall not consider the cost of plows and other equipment, since for a comparative study of the cost of plowing with different sizes of tractors it matters very little.

A two and a four-bottom tractor and plow can easily be operated by one man, while for an eight-bottom tractor two men are necessary, not for lifting and lowering the bottoms, which can be done automatically, but for cleaning and unclogging the plows, which would mean stopping the machine often if it were expected to be done by the man steering the tractor.

The expense for operator would therefore come to 30 cents per hour for the two and four-plow outfit and 60 cents for the eight-plow outfit.

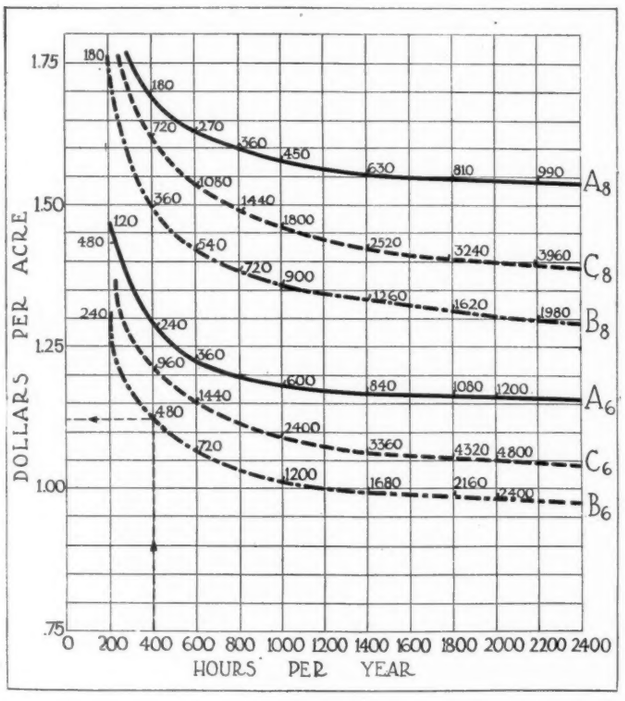
Experience has shown that the fuel consumption of gasoline tractors per hp.-hour changes little or nothing with the size of motor, provided all are built according to the same standards and are run at the same percentage of load. In our case the cost for fuel (and oil, etc.) should be for tractor A 25 cents per hour, for tractor B 50 cents per hour, and for tractor C $1 per hour.

Depreciation Factor

One hears very often the statement that a tractor will last 5 or 6 years; such a statement is fundamentally wrong. There are two reasons why a tractor, and any machine in general, depreciates; first, the wear and tear of the machine, a factor which is altogether independent of the age of a machine, the only thing affecting it being the actual working hours; and, second, the obsolescence which, on the contrary, depends upon the age of the machine and not upon the working hours. The last factor is more important than the first in automobiles or any products subject to change of style, but with utility products it has little importance unless a new invention comes to change fundamentally the existing conditions. Yet, even among automobiles the Ford car, model T, has not become obsolete after years of use, and I know of American tractor manufacturers who have not improved their tractors materially since 1911-1912 and are now selling more tractors of the same type in a month than they made all told up to 1915, while some of the machines they sold in 1912 are still going strong. Therefore, it is appropriate to base the allowance for depreciation upon the total actual working hours of a tractor, provided it be of progressive design, and not upon total life. This should apply satisfactorily to horses or any draft animals whose average life is nearly constant whether they work or not.

It is a conservative estimate to say that tractors of modern design of any size will depreciate after about 4500 hours of plowing, which would give a tractor, plowing 10 hours a day, for 90 days in a year, a life of 5 years, provided no other work is done but plowing. This estimate is safe, since should the tractor in the last case become obsolete after 8 years, 80 per cent of its value has already been figured in the item, for wear and tear, having left only 20 per cent, part of which can easily be recovered from the sale of its high-grade materials as junk.

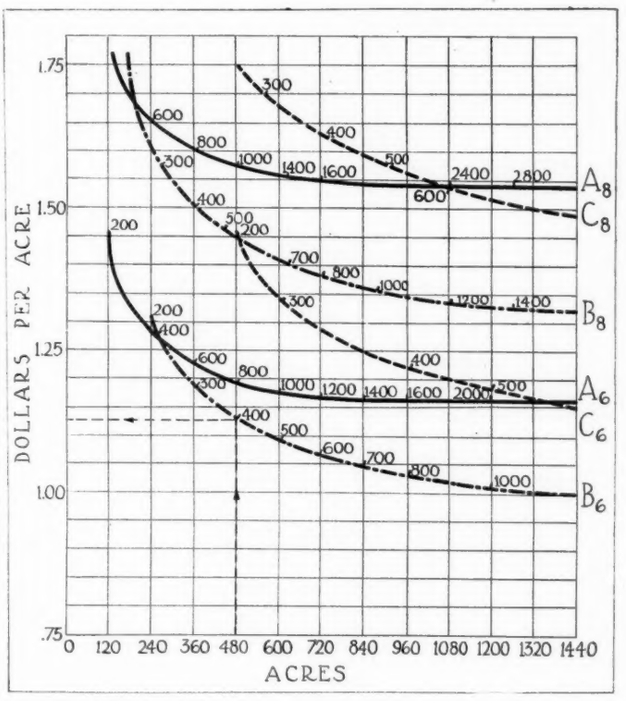
For our tractor A the amount for depreciation per plowing-hour figures at $\frac{600}{4500}$ = $0.13, for the tractor B at $\frac{1500}{4500}$ = $0.33, for the tractor C at $\frac{3600}{4500}$ = $0.80.



GRAPH 2

Cost of plowing per acre with varying number of plowing hours per year. A6, B6 and C6 represent conditions for 2, 4 and 8 plow tractor, respectively plowing 6 in. deep. Same tractors plowing 8 in. deep are represented by A8, B8, C8.

If you know the number of hours of plowing per year read it on the horizontal co-ordinate, follow the vertical line through this point to the point of intersection with A6, B6, C6 curve for 6 in. deep plowing (or A8, B8 or C8 curve for 8 in. plowing) and read the cost in dollars per acre on the vertical scale. The figure at the intersection point tells the number of acres the tractor will plow per year under the chosen conditions



GRAPH 3

Cost of plowing per acre with varying number of acres to be plowed per year. A6, B6 and C6 represent conditions for 2, 4 and 8 plow tractor, respectively plowing 6 in. deep. A8, B8 and C8 represent the same tractor plowing 8 in. deep.

If you know the number of acres to be plowed per year read it on the horizontal co-ordinate, follow the vertical line through this point to the point of intersection with A6, B6 and C6, A8, B8 or C8, according to size of tractor and depth of plowing, and read the cost in dollars per acre on the vertical scale. The figures along the curve at the intersection point tell the number of hours per year the tractor will have to work in order to accomplish the desired work

These two factors are considered together and estimated at 6 per cent per year on the initial price of the tractor. Since the value of the tractor depreciates constantly, in time the interest on this value also decreases. Suppose the tractor is figured to depreciate in 6 years, the interest during the first year would be 6 per cent of the initial price paid, the following year it would be 6 per cent on the present value of the tractor, or 5 per cent on the *total* initial price, and so on. The allowance for interest and repairs being 6 per cent per year on the total initial price, it results that no repair allowance is made for the first year, 1 per cent of total initial value for the second, 2 per cent for the third, and so on, an estimate which corresponds with the actual conditions as they occur with tractors of modern design.

Suppose we figure every one of these items for the tractors chosen, for a variable number of actual plowing hours per year, Graph 1 is drawn based upon these figures, marking on the horizontal co-ordinate the number of actual plowing hours per year, 200, 400, 600, etc., and so on, the vertical co-ordinate, the cost for plowing per hour; the curves marked A, B and C correspond to the machines above mentioned.

Graph 1 does not give a final indication as to the comparative cost of plowing with the different sizes of tractors, but it is used for making graphs 2 and 3. Graph 2 gives the cost in dollars per acre, varying with the number of hours of plowing. Tractors A, B, C are supposed to pull 2, 4 and 8 bottoms, 14 in. wide, 6 in. deep at a speed of 2.5 m.p.h. It is assumed that the tractors will plow only 85 per cent of time they are in the field, 15 per cent being the allowance for turning the headlands, oiling, trouble, etc. The area actually plowed per hour figures then at .6, 1.2, or 2.4 acres per hour respectively. The small figures along the curves give the number of acres per year the chosen tractor would actually plow.

From graph 2, as a basis, graph 3 has been drawn, and this gives now the final information we were after; we read the area to be plowed in a year on the horizontal co-ordinate, follow the vertical through this point until it intersects with the curve representing the A, B or C tractor, and following to the left we read on the vertical co-ordinate the cost of plowing per acre. The figures along the curves give the number of hours the tractor will have to work in order to perform the work expected. Recalling now that A_6, B_6 and C_6 represent the conditions for a 2, 4 or 8-plow tractor plowing 6 in. deep, while A_8, B_8 and C_8 represent these tractors plowing 8 in. deep, let us now consider the significance of graph 3.

If we have to plow less than 250 acres per year and not deeper than 6 in., the tractor with 9DB-HP plows the cheapest, while for anything above this amount the 4-plow tractor with about 18 DB-HP is the cheapest in the end, *i.e.*, it is cheaper than the 2-plow tractor for small farms, while even for farms so large that one 4-plow tractor be too small, it pays better to have two 4-plow tractors than one 8-plow tractor. The advantage of having two smaller power plant units instead of one large one from the point of flexibility and in emergency cases (break down, etc.) are not considered at all in the charts.

The chart shows much more than this. It shows how much cheaper the plowing comes if there be much of it to be done. There are, nevertheless, two ways that will make the small farmer meet the competition of the big one, without having to buy his neighbor's land: by deeper plowing, and by plowing early and quick. To meet both of these conditions the 2-plow tractor will give way to the larger one; in fact, we find on the upper curves that represent the cost for plowing 8 in. deep, that for any land above 180 acres of plowing per year, the 4-plow tractor is the cheapest. While for 240 acres of plowing per year the 4-plow tractor figures only a little cheaper in dollars and cents, it has the advantage that it performs the work in about 30 days instead of 60, as is necessary with the smaller one.

Now, there are two ways of making a tractor, intended to pull 4 bottoms 6 in. deep, plow 8 in. deep. First, by hitching 3 plow bottoms instead of 4; second, by leaving the 4 on and plowing at the lower speed of about 1.9 m.p.h. instead of 2.5 m.p.h. (which every tractor should have); the area plowed per hour and the cost is nearly the same. In fact, there is a great advantage by applying the first method, since we can easier count on continually using the full power of the tractor where its efficiency is the highest. Hard spots on the land, or grades, will be overcome by shifting to the low-speed gear. On the other hand, with a two-plow tractor intended for 6-in. deep plowing we have no other choice, if extra expense for specially narrow bottoms should be avoided, but to run the plows 8 in. deep on low speed, all the time.

Tractor and Truck Problems

Manufacturers have too long likened the tractor manufacturing problems to the truck problems. There is a good reason for building 4 or 5 sizes of trucks in the same plant: A 5-ton load cannot be handled sometimes by either one or two 3-ton trucks, nor is it economical to run a 3-ton truck with a 1-ton load, but in plowing the load can easily be adapted to the full power of the tractor.

It is important to note that the above conclusion has been reached, although the preliminary assumption was made that the 2-plow tractor will probably be the most popular type and therefore the cheapest to manufacture. But since we have reached the conclusion that the 4-plow outfit is the most economical it can be expected that due to its production in large quantities its price per horsepower will *not* be 25 per cent higher than that of the 2-plow outfit as assumed at the start of this analysis, but perhaps even lower.

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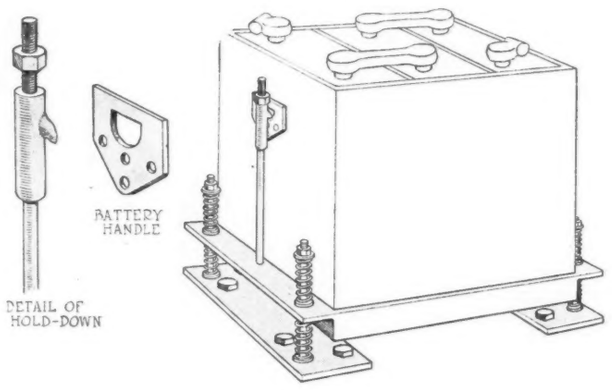
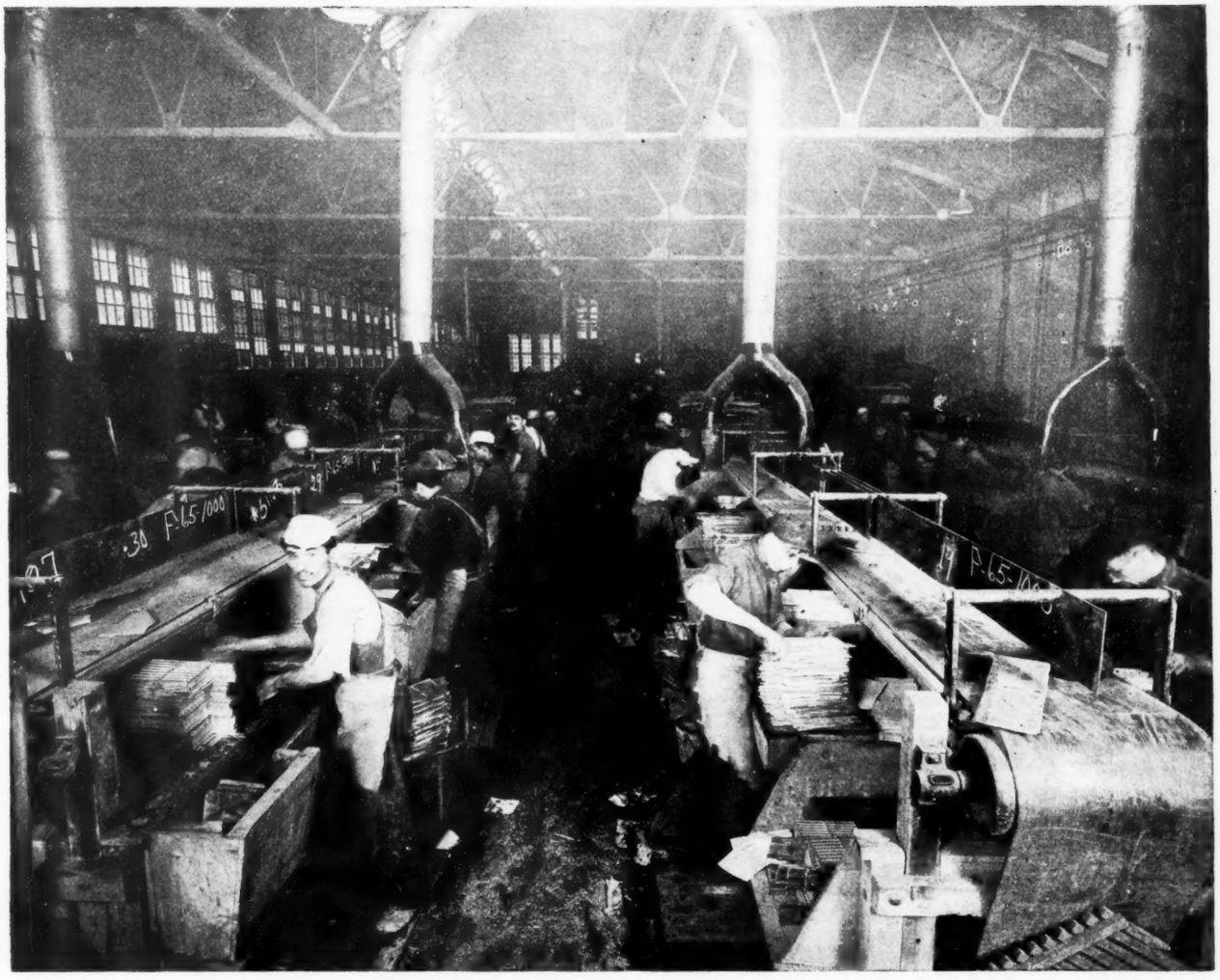
Vesta Spring Battery Mounting

THE Vesta Accumulator Co. of Chicago is using a spring battery mounting for storage battery installation on certain trucks, whereby shocks to the battery are greatly decreased, thus promoting the life of the battery.

Briefly, the battery rests on a metal tray that is suspended between four coiled steel springs that are bolted to the truck body, or running board. These frames are ⅛ in. steel wire wound to 13/16 in. diameter, the lower one being 2¾ in. long and the upper one 2 in. long, and the tension on them may be adjusted by nuts at the top of the supporting bolts. The tray is malleable iron and the battery is held firmly in it by means of hold-downs clamped in the battery handle.





Part of the belt conveyor system used extensively in the Willard plant

Progressive Battery Manufacture

Conveyor System Used Extensively in Willard Plant—Lifting of Parts Reduced to Minimum—Speed of Operation Kept Constant

THE Willard Storage Battery Co. manufactures 6000 automobile storage batteries per day, and in doing so gives an example of efficiency in manufacture which is remarkable in view of the number of small and detail parts and operations to be handled during the process. The factory in Cleveland has a floor space of 310,000 sq. ft., and with additional buildings planned and in some cases under construction the area will soon be in excess of 443,000 sq. ft.

Willard batteries are in two types: The older, which is still manufactured on a large scale, uses the grooved-wood insulation, and the new, using a threaded rubber insulation. The wood insulation is made at the factory, but the rubber-threaded fabric, as well as the rubber jars, is made in an outside factory under Willard supervision.

In manufacture, the units composing the batteries move toward each other from the opposite ends of the row of buildings. On one side the woodwork which enters into the insulation and the battery cases begins to take form, and at the other end vats of sulphuric acid, pigs of lead and other chemical and metallic elements start the procession of the other groups of material toward the assembly room at the center of the plant. The insulation and battery cases, which are impregnated and painted and treated to meet the requirements, work one way, while the acid used as the electrolyte, the grids holding the active material, and the active materials work in the opposite direction so that they meet in the assembly room.

Starting at the stockroom, where the woodwork commences, the primary operation is the preparation of the basswood veneer planks used for the insulators. These strips of veneer pass through a grooving machine, which forms the grooves in one side of the veneer, leaving the other side plain. These grooved strips are then grouped and cut to size by a cross-cut saw, after which they are placed in a warm alkali solution to remove acetic and other organic acids. The acid is washed off to remove the alkali and the

Machine used for grooving wood for separators

insulators are trimmed to size in a bandsaw. There are variations in the sizes of the insulators for different types and sizes of batteries, and the trimming is so arranged as to take care of the work necessary at the time.

Requirements of Battery Case Material

For the battery cases, which are also made in this woodwork department, the best white oak is used. Special care is demanded in selecting the oak, which if not properly dried will not meet the acid-resistance requirements. The cases are made of kiln-dried oak, free from knots, worm holes, checks or imperfections of any kind. Where a case is completed with a defective piece of lumber it is always thrown out by the final inspector and the defective piece replaced with a perfect one. Wood insulators are made from porous wood, principally bass, cypress or cedar. Only bass made from a circular veneer is used. The veneer is obtained in the open market, grooved and treated in the Willard factory.

The battery cases are of 9/16-in. stock for starting and lighting, and the first operation is to cut the pieces of oak to size. These pieces are placed on standard carriers, which can readily take the piles of cut wood pieces from benches, also of standard height, and conduct them from machine to machine. The second machine cuts the edges of the box for joints, and the third puts a tongue in the bottom piece to fit the size of the case. The part number is stamped on the sides of the box, the holes for the handles are drilled, and grooves for the sealing compound which enters between the case and the jar are also supplied. The pieces of wood are then fed into an ingenious machine which automatically assembles and glues the pieces together.

This machine assembles twenty-four boxes per minute. It is operated by three men, and the complete box comes out on a conveyor belt beneath the machine. The boxes are drilled for screw holes and the screws placed in by an automatic screw machine. The corners are dowled and the boxes are sandpapered, cut to the proper height, beveled, inspected and puttied, and finally shot through a hole in the wall to the paint shop. In the paint shop the tops and bottoms are dipped and the paint sprayed on while they are on a rotary table. The sides are given two coats and the top and bottom three. The handles are then put on by an automatic machine, the jars put into the cases, and passed along.

These jars made from pure rubber are vulcanized to have a tensile strength of 3600 lb. per sq. in., with an elongation of 3 per cent. Before they are permitted to pass they are tested for dielectric strength in a machine which subjects them to a pressure of 23,000 volts. This machine is made in the form of a table, and the operator who sits before it must use both hands to operate the machine, thus guarding against any chance of accidents from the high tension current. The handles for turning on the current are located to the left and to the right of the operator, so that there is no chance of his being near the point of application of the current to the jar.

In addition to this electric test to which every jar is submitted, samples of every shipment go to the laboratory for test for physical requirements. All the threaded rubber insulators are inspected at the Willard factory, in addition to the inspections made at the rubber factory, to see that there are no pin holes or other points of leakage in the insulator.

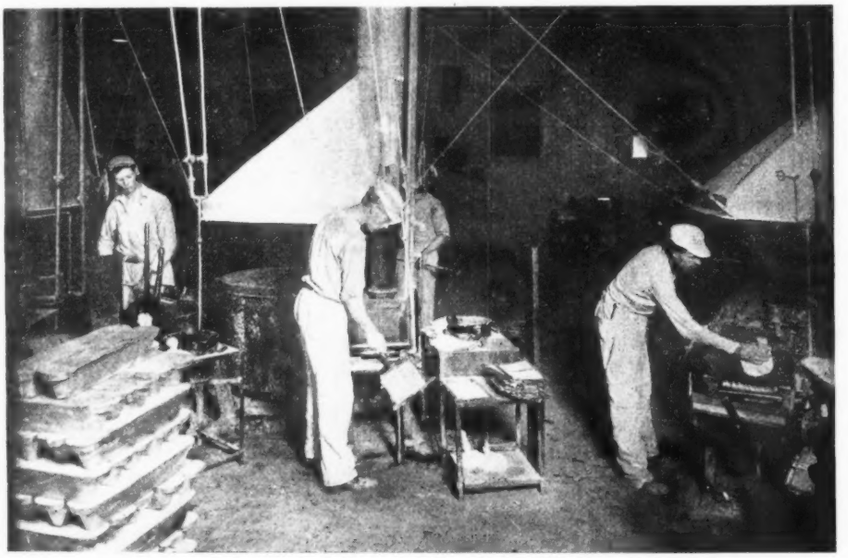
Metal Parts Lead-Plated

All the metal parts used in the battery are lead-plated, if they are brass or copper. Or, if they are steel, they are first copper-plated and afterward lead-plated. There are plating rooms for this purpose.

At the opposite end of the plant from that at which the woodwork is carried out is the receiving room for another class of raw materials. Here the acid is delivered and is sucked into vats and diluted from 1.835 to 1.300 specific gravity. This is for automobile batteries. Different gravities are needed in different parts of the processes, and for special purposes other gravities are necessary.

Acid is received in the concentrated form. This is handled by specially trained men in an acid tower, where the acid is mixed to the proper gravity. In its diluted form, acid is not dangerous to handle. The only serious effect is on the clothing, and rubber gloves, rubber aprons and rubber boots are provided to the men who necessarily have to work in the presence of acid. Acid is purchased from one of the large chemical companies which uses the so-called "contact" process, whereby sulphur dioxide is oxidized to the higher oxide of sulphur tri-oxide in the presence of a catalytic agent, sulphur tri-oxide plus water making sulphuric acid.

Pigs of lead and antimony are also received at this end of the plant and also refined scrap lead from the foundry in the Willard factory is used to form the materials for the grids. The grids are cast of an alloy of antimony and lead. Two plates are made to a casting. There is no difficulty in obtaining an adequate supply of pure lead. The principal impurity in lead to look out for is iron, and the Willard



Casting plates in pairs joined together

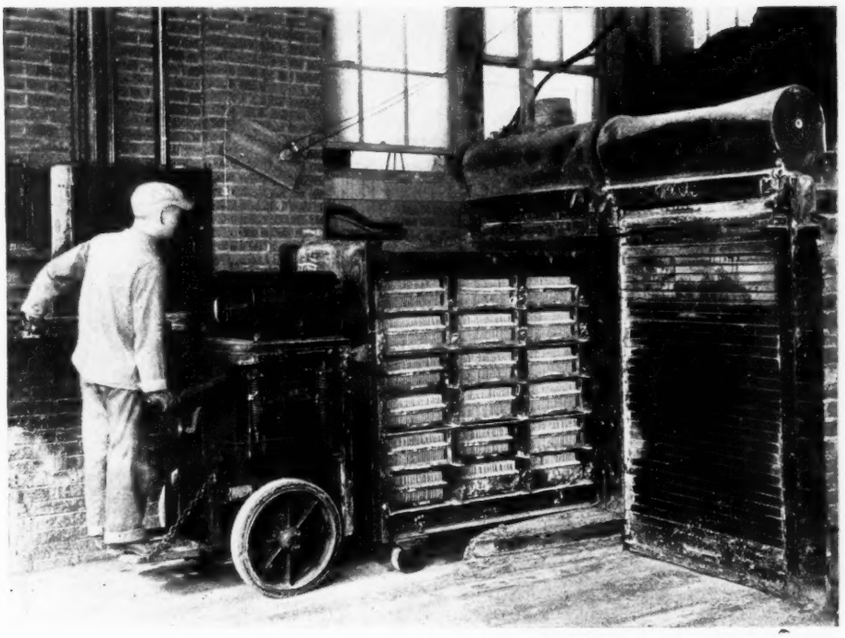
company does not allow impurities to run over the following amounts:

Iron	0.01 per cent
Copper	0.75 per cent
Nickel	0.1 per cent
Silver	Trace
Arsenic	Trace

The amount of pure lead rejected is negligible. Only rarely are these analyses running with impurities as above shown.

The Willard company does no refining in the sense of refining commercial pig. It does, however, run a small smelter for reclaiming the scrap material, which consists of two operations, one of reducing the oxides to metallic lead and the second of refining the metallic for suitable pigs to be used in production. Incidentally, the question of pure lead is a minor one in comparison with the requirements for oxides which are used in the making of the paste.

After the castings have been made they are trimmed and flattened in a punch press. These castings are made in molds which resemble waffle irons. The two plates which are cast together are kept together for the time being and are worked in pairs.



Putting racks of plates in the drier after forming

Besides the grid castings other miscellaneous castings are made in the foundry department, such as the connecting straps, the top connectors, the lead heads on top of the connector studs, etc. All of these are carried from place to place in standard carriers made in the form of a litter type box with four handles.

Paste Mixing Critical Point

While the plates are cast in the foundry department, the active material for these plates has been in process of mixture in another department. The most critical point in battery manufacture is the mixing of the paste. For the positive plates a red lead base is used, the chemical formula being $Pb_3\ O_4$, while for the negative plate $Pb\ O$ is used. These materials are pressed into the grids. The operators use maple paddles to do the work. The grids are carried into the pasting room in the standard carriers mentioned so that they can be handled in considerable lots in a very efficient manner without taking up an excessive amount of room.

After pasting has been done the grids are put into racks, where they are held separately from one another, and they are then rolled into the driers by means of an automatic-lifting electric truck which picks up the rack and pushes it into the drier, where it is subjected to a hot-air blast.

The racks of grids and the carrier enter into one side of the drying chamber and come out of the other. The temperature starts at about 120 deg. at one end of the drier and goes higher toward the other end, and when they leave the drier the racks of plates containing the hardened active material are ready to go into the forming room. The plates receive their primary forming in tanks holding forty positive and forty negative plates. They are formed at a rate of 2.3 volts per cell and receive a charge of about 1 amp. per plate. The plates receive this primary forming before going into the battery. The length of time required to give the plates this primary forming is about five days on the average, the time ranging between four days and six days. During the forming charge the active material changes its chemical composition, the positive elements changing to lead peroxide and the negative to pure sponge lead.

After forming, the positive plates are washed in hot water and air-dried, while the negative plates are dried in air, and in doing so the active material changes back to litharge, or $Pb\ O$. Forming and initial charging requires a larger space in the factory than any other process. The floor space occupied in the factory by these two departments is approximately 25 per cent of the total area.

The next step in the preparation of the plates is to cut them apart, as during the entire series of operations the two grids have been handled together as one plate, thus saving considerable time in the handling operations and halving the number of parts to be taken care of up to this period of manufacture. The plates are cut in two in a punch press, and alongside of each press there is a man who examines the plates for cracks or other defects. When this is done the manufacture of the plates is complete and they go to the stockroom, where they are drawn upon for assembly in the battery.

Efficient Assembly

It is in the assembling department that the need for the highest efficiency is apparent. Here all the plates containing the active materials, the wood or rubber-threaded insulators, the rubber jars, the oak cases, the sealing compound, the connector stops, etc., must be brought together, and the method used for doing this is a continuous traveling assembly system which does not permit of a halt in operations from the time the batteries start on the procession of assembly until they are finished.

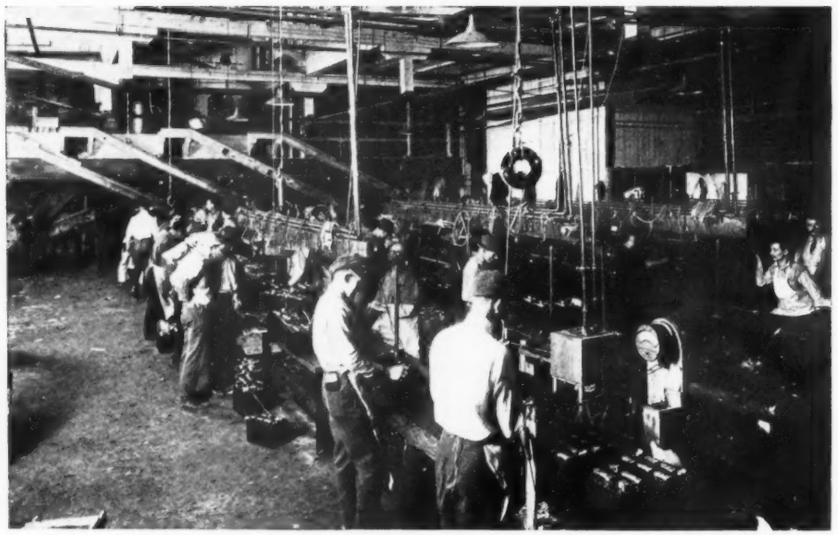
The first operation in assembly is to burn the plates to a strap connecting them together to form a positive or negative group. This burning is done with the oxy-acetylene flame and is handled on long benches.

In the second operation the positive and negative groups are brought together, being held down by little wood blocks which are slipped in, each wedge holding the positive and negative groups in proper relation with each other. After these two groups have been brought together the insulators are slipped into place between adjacent plates, and the assembly started on the conveyor bench.

This conveyor bench travels steadily along, carrying the assembly processes from step to step. After the groups which are held together by the little wood blocks arrive at the next stage they are inspected and put into jars. They are then gaged for the distance between connectors, tested for shorts by means of an electric bell circuit which rings when a short exists, and the covers are put on.

Conveyor Carries Batteries

Next in order is the introduction of the sealing compound, which is poured between the cover and the jar, and when this is placed in the conveyors carry the batteries under the cold air drier, which hardens the sealing compound. As it is a rubber asphaltum material, it cools rapidly under the



Final assembly, showing the chutes from the gallery for parts

influence of the cold air and is then ready to be scraped off. They are now ready to receive another forming charge.

They are put into standard charging cases of wood and given a temporary wiring for charging. All this time they have been passing along the conveyor belt, which is not allowed to stop under any circumstances. The materials for the work have been kept constantly supplied to the workmen situated at the different stations along the conveyor. When they have reached the stage where they are ready to be formed again, they are filled with acid at 1.300 specific gravity and loaded on a standard height truck and taken to the charging tables. Here they are slid off onto the tables, which are also of standard height, thus eliminating any necessity for lifting on the part of the workmen, and they are charged six or seven days at about ½ amp. per plate.

Finding Defective Cells

It will be seen that this rate corresponds to the previous one on the preliminary charge, as at that time the plates were double because they had not yet been cut apart. During this charging the specific gravity is read from time to time to keep a check on the battery and thus to locate any defective cells. During the last day the gravity is adjusted to be 1.285 at 70 deg., and when the forming is finished the cells are slid back onto the trucks off the forming tables and taken to the finishing department.

In the finishing department the conveyor belt system again takes hold of the batteries and moves them progressively along. The cases for the batteries are sent down from the balcony above to the conveyor table by means of chutes, and it is part of the duties of those handling the boxes to see that there is always a sufficient supply on hand to take care of the batteries that are going through, so that under no circumstances will a conveyor table have to stop. The first step in the finishing department is to place the cells into the boxes and put the top connector and terminals on and securely fasten them by burning them to the connecting strap posts. The positive side of the battery is then branded and a date symbol placed on the side of the box. Tests are made to show that the cells are correctly located, the cases touched up with acid-proof paint, a final inspection given for specific gravity, proper connector burning and general appearance; the name plates are put on, a test for gravity given, and the batteries pass right along to the shipping department.

No Manual Lifting

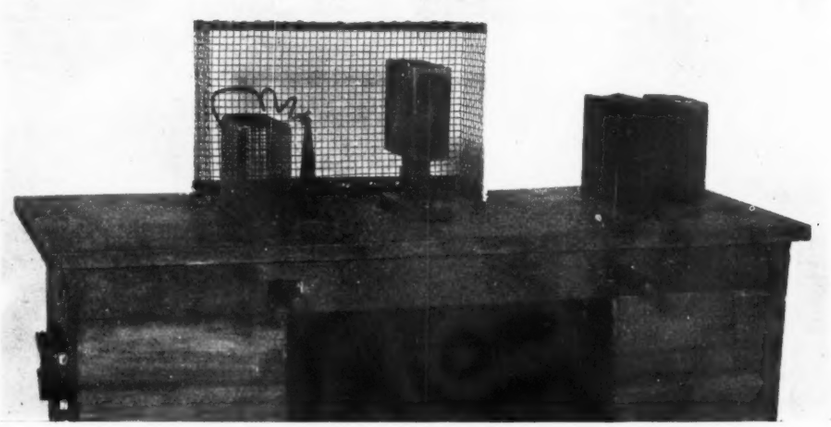
In all these operations the work of battery manufacture is distinctively progressive throughout the factory. There are labor-saving steps which are noteworthy in that they do away with the necessity for lifting. One of the most important facts which has been borne in mind throughout the plant is to have everything possible of a standard height, so that when a truck filled with boxes, containing plates, etc., is brought up against the table the boxes can be pushed from the truck directly onto the table without any lifting. This height is calculated so that the men can work without stooping, and in spite of the fact that the parts handled are small and of great number, considering the daily output of 6000, an efficient manufacturing and assembling layout is provided.

It is the practice to ship all batteries filled with electrolyte, except when the battery is to be shipped abroad. It is then prepared for shipment by dumping out the acid, allowing it to stand three or four hours, and then putting an additional soft rubber cap over the vent plug, which prevents air from entering the cell, but does not prevent any gas that may form inside from being relieved.

Batteries are generally shipped by two different methods: First, car-load lots in which flat crates are used, four to six batteries, depending upon the size, being placed in each crate with packing paper protecting the battery from the side of the crate. These crates are of such size that they make two rows across the car, and are piled two to four high, depending upon the number of batteries in the crate. The crates are properly braced with shoring, which is the only precaution used against tipping over.

The second method is packing them in individual shipments in less than carloads, in which batteries are placed in what is known as "house-top" crates. House-top crates are made for one to four batteries, depending upon the size and number of batteries to be packed. The crates are so constructed with projecting pieces that there is only one side which will rest on a flat surface, that being the bottom.

The inspection department is practically divorced from the production department. Both departments, however, come under the chief engineer, the production department through the factory manager, and the inspection department through the chief inspector. The factory manager, however, has no authority over the chief inspector, who reports directly to the chief engineer.



Apparatus employed for testing dielectric strength of cells

Safety Engineering in Automotive Plants

Part II

Problems of Protecting the Eyes of Workmen While Working on Grinders Outside the Regular Grinding Room—Guards for Circular Saws Used for Variety of Work

MEN working on grinders must wear goggles, but it is not a good plan to put a pair of goggles alongside of a grinder, for the use of whoever may operate the machine, according to W. E. Williams, safety engineer of the Packard Motor Car Co., who introduced the discussion on the subject of Goggles for Isolated Grinders at the Automotive Section meeting of the National Safety Congress. Mr. Williams holds that this plan results in spreading contagious diseases, especially trachoma and diseases of the eye and skin. It is not a practical plan, either, to put a cabinet alongside of the emery wheels and expect men coming to the wheel to use it, to get a pair of goggles out of the cabinet; they won't do it.

The Ford Motor Co, according to Safety Engineer Robert A. Shaw, puts a glass on every emery grinder and every small tool grinder in the plant, and has done so for the past 2 years. Recently the company has introduced in its plant a special pump for keeping water on the wheel, and although about twenty wheels with such pumps have been in service now for some time, not a man has been hurt or an eye lost at any of these wheels. It is Mr. Shaw's idea that if water can be kept flowing over the wheels the possibility of small particles of emery flying out from the wheels is very much reduced.

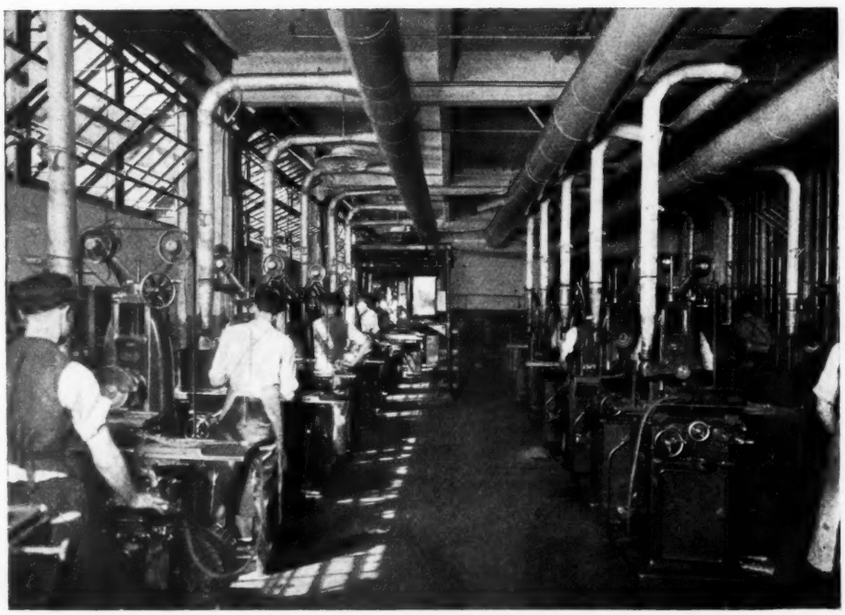
At the plant of the Willys-Morrow Co., Elmira, N. Y., each of the men working on grinders is given a pair of goggles, which are signed up to him and which he must return. The goggles are inspected and disinfected about twice a week and no one else besides the man to whom they are assigned is allowed to wear them. Goggles are worn all day long. According to John Forbes of the Willys-Morrow Co., the best type of goggles has rubber over the ears and can be adjusted to fit. The tool department is equipped in the same way and there are very few accidents.

A great problem of the safety engineers has been to get the men who come to the grinder occasionally to use goggles while working on the grinder. Mr. Forbes' plan is to impress the necessity of using goggles upon every workman coming to the first aid room to have something taken out of his eye. If the man refuses to wear them a representative of the safety department approaches his foreman with the request to urge the man to use the goggles.

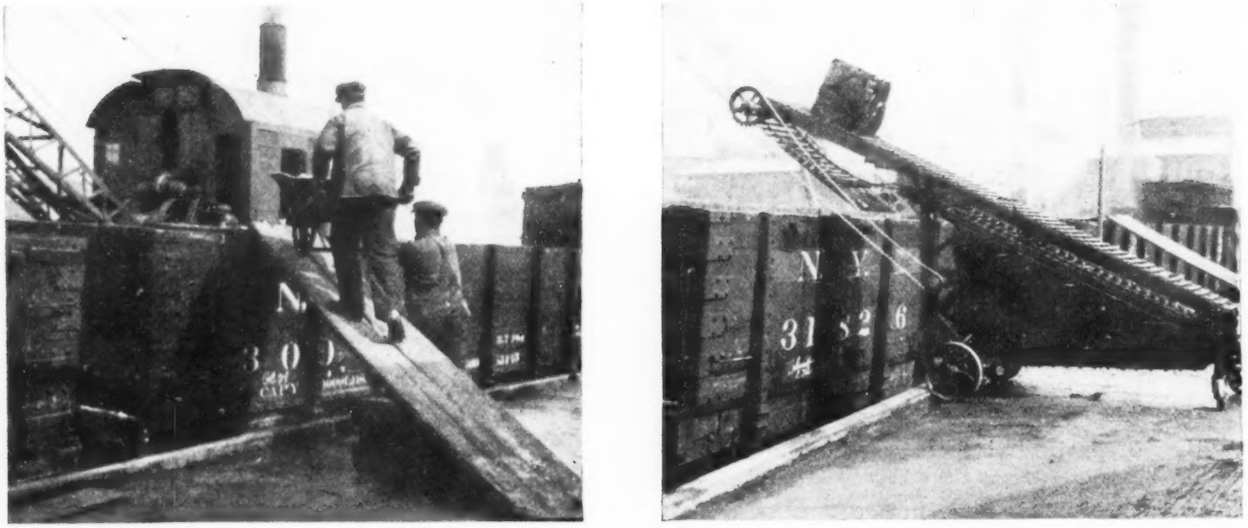
Where glass plates are used in front of grinders on which greasy tools are being ground it is a problem to keep the glasses clean. Where formed tools have to be ground the work is very close and it is difficult to use a shield if it is at all dirty. In the automatics room of the Packard plant, where there are twenty-two isolated grinders, each one is equipped with a wired glass shield. An apprentice is working alongside of every emery wheel and it is his duty, as soon as oil gets onto the glass plate, to dip it in a pail of gasoline. The Packard company instructs its apprentices in safety principles even before they are taught the actual use of the machine. They are shown the right and wrong way of doing various things, and the results achieved are said to have been surprising. In the regular grinding departments, where the parts ground are free from oil, the janitor cleans the shields every morning on going through the department. He also goes through the department in the afternoon, and if the glass requires cleaning at that time he will attend to it. The janitor also replaces the glass shield when necessary.

In regard to the trouble from oil on tools being ground, this might be greatly reduced by dipping the tools in gasoline before bringing them to the grinder, but most companies now frown on the use of gasoline for this purpose owing to the hazards involved. The Packard Motor Car Co. is experimenting with tetrachloride. It is put into a small container about 8 in. deep, 6 in. wide and ¾ in. thick, so that a man can get his fingers in to clean off the oil. It has been the experience that if it is left to the workmen to clean off the oil from the tools before grinding them they will neglect to do it in practically every case. As the result of a serious accident with gasoline the Packard company does not allow more than one pint of it in any department, and this is kept in an air-tight, sealed can. Only enough is put into the cleaning tank to accommodate the plate to be washed.

Much objection is raised to the use of goggles by the men on the ground that they are too heavy. The tendency among goggle manufacturers has been to increase the safety flanges and to use heavier glass, so that if the glass is struck it will not show. The Reo Motor Car Co. requires its



A modern grinding room, showing installation of suction apparatus for removing dust as soon as formed (Ford)

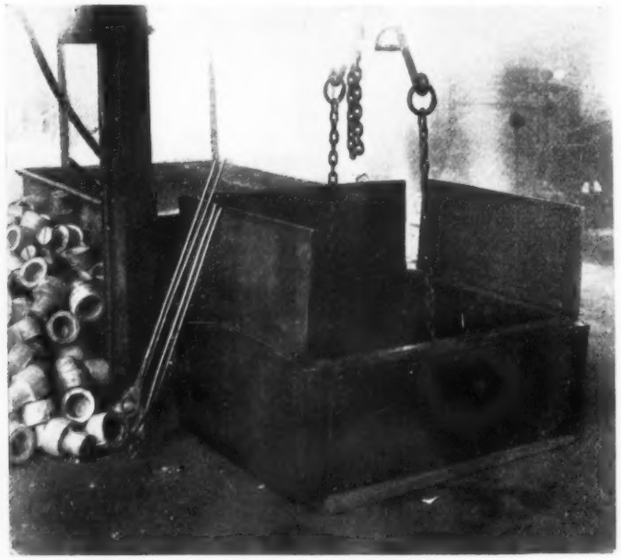


Loading scrap—unsafe and safe methods (Overland)

men to wear heavy glasses only on heavy work. The question of sterilization and re-use has also come up and the Reo company is experimenting with a dry cleaner. The sweat from the man's face will sometimes drop on the glass and cover it with a mist, so that the man cannot see through it. A Michigan chemical company is using a type of glass with an opening for ventilation at the top. The reason for placing the opening at the top is that it seems less likely that articles would get into the eye over the top of the glasses.

In a new type of light goggle recently put out there are two lenses which are fastened together with a celluloid cement. An advantage of this is that the cement will hold the lenses together even though the outer lens is shattered. Goggles are often ruined by the men putting them into their hip pockets and then sitting on them, and this habit seems to be especially prevalent among moulders. This causes the side guards to bend up in such a manner that they cannot be straightened out without being broken.

Goggles with different colored lenses are used for various purposes. The Packard company in its tool grinding room, where the wheels are thoroughly guarded and where grinding is done to close limits, so that wheel breakage does not have to be figured with, uses light goggles. These goggles have amber lenses, which reduce the excessive light from the sparks thrown off by the grinder to a certain extent. The Ford company recently ordered 600 pairs of goggles for men working on shapers, and Safety Engineer Shaw of the company thinks that this is a new field for the use of goggles in machine shops.



Guard for oil vat in the heat treating department, preventing men accidentally falling into the vat (Reo)

Disk grinders also present certain hazards, as some of the abrasive on the disks, if it gets behind the eye, is hard to draw out unless a magnet is used. Such accidents must be guarded against by requiring the men to wear goggles or by using suitable guards. The Packard Motor Car Co. uses a guard of its own design on all its disk grinders and has never had an accident in this department in a 2½-year period. The opening opposite the grinding surface of the disk is made large enough to take care of all the particles, but not larger than the area the pipe will accommodate. When the dirt is thrown from the periphery of the wheel it enters a small channel, and the dirt and air are carried away immediately. All men working on emery buffers are required to wear goggles.

Some companies furnish their men cases for their goggles so as to prevent breaking them when they are not being used. Trouble has been experienced with polishers who are elderly men and have to wear glasses. They cannot wear goggles and their regular glasses at the same time. This problem has been solved in some plants by making the goggles with the men's own lenses so that they do not have to wear two pairs of glasses. The Cadillac Motor Co., for instance, in the case of men whose work requires the use of goggles, if the man wears special lenses he is sent to an oculist to have his glasses properly fitted. The company formerly had the men bring their prescription but found that the practice was not a good one.

One objection to the plan described is that special rounded lenses cost at least $1.50 per lens, and as the lenses will get pitted by the flying emery the expense is rather heavy. If a plain covering lens could be used, which can be bought for about 10 cents, a considerable saving could be effected. One trouble with the rubber padded type of lens is that the rubber melts in hot weather. Men in the Cadillac shops working on aluminum have been wearing goggles with wire screens in place of the lenses. In cutting aluminum the chips do not fly so hard as they do in cutting cast iron, and while the screen goggles are not as good as glass, they are better than none at all.

While unskilled workmen for the most part readily agree to wear goggles where it seems necessary, great difficulty is experienced in getting skilled workmen to use them. The Ford Motor Co., however, has adopted a rigid rule that every one of its tool makers will have to wear a pair of the spectacles the company has selected for the work or else get a pair of goggles for himself. Every foreman is held re-

sponsible for the enforcement of this rule, which was adopted because a great many good tool makers were injured by red hot chips burning their eyes. If the men would learn to stand to one side in grinding there would not be so many accidents, but the average man stands right in front of the wheel.

As to the frequency of eye trouble in machine shops, Mr. Shirley of the Gilbert & Barker Mfg. Co. reports that among a total of 1200 employees they had 123 cases of eye trouble in one month, chiefly due to emery particles. A campaign of education by means of posters and bulletin boards had been conducted, but the men did not seem to take it as seriously as they should have. All the foremen are cautioned to provide glasses. The men go to the foreman for the glasses and are held responsible for their upkeep and sanitation.

The Reo Motor Car Co. repairs all its goggles and requires each man, upon being furnished a pair, to deposit a dollar at the office, which tends to make him take better care of them. If the goggles are wilfully abused the workman forfeits his dollar. No trouble has been encountered in enforcing this rule.

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Guarding Circular Saws on Variety Work

ONE of the most difficult problems confronting safety engineers is to devise a practicable guard for circular saws on which all sorts of jobs are done in rotation. The Chevrolet company put guards on these saws because the State requires it, but the men turned them back because they found the guards interfered with the work.

The Reo Motor Car Co. uses the Jones guard and finds it very serviceable. Some of the men have objected to the guard, but these objections have been stilled by the reply that if the men would not use it the company would get others who would. Mr. Livingstone, the company's safety engineer, watched one of the saws carefully for a period of several weeks, and every time he observed it the guard was off. To bring the matter to a head he approached the man working at the saw and asked him why he did not use the guard. The reply was that it was no good. "Suppose I wanted to take a 'two-by-four' and slot the end of it, how could I use that guard?"

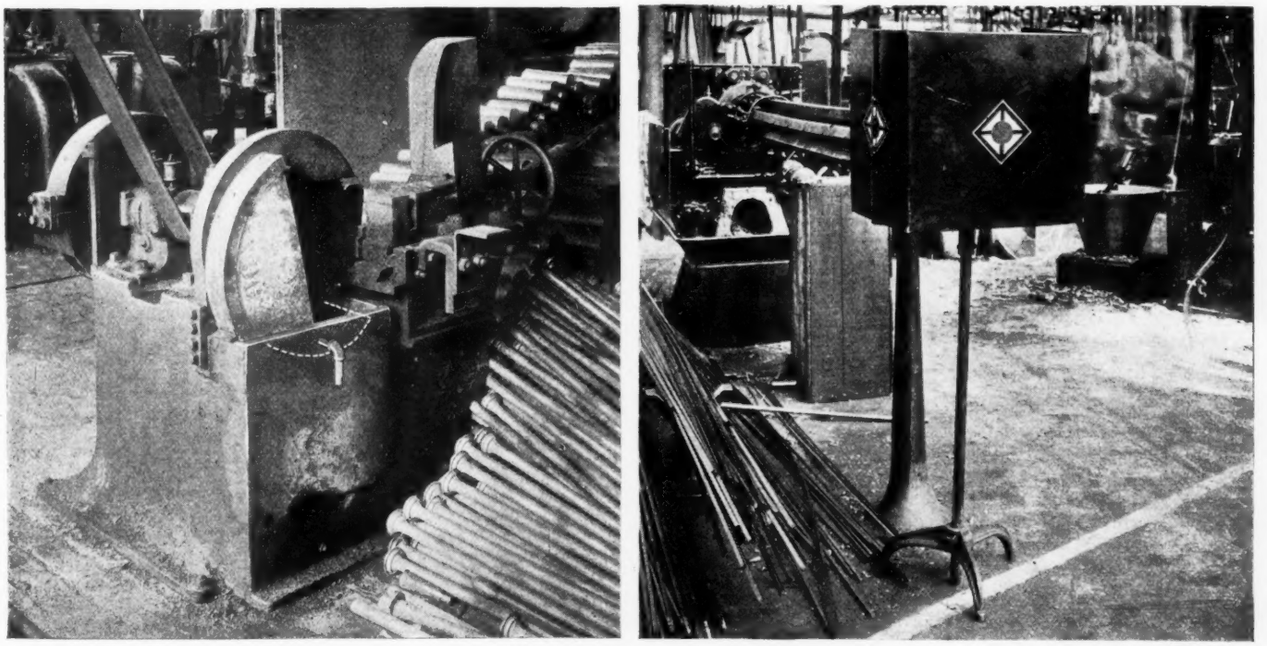
Mr. Livingstone holds that this was no valid objection, and he informed the man that he could have his choice between using the guard and quitting his job. There has been no trouble since.

Experiments have been carried on for a period of more than three years by the Packard Motor Car Co. with no less than thirty-seven guards, both home-made and bought from dealers. To illustrate the problem facing the construction department, Mr. Williams, the company's safety engineer, relates the following: "They are building and putting up a partition and want a dado at the end of a board. There is not a guard in the market that will allow you to cut that dado. One of the company's guards will probably cut 4 by 4 or 4 by 6. A man will come along and say, 'Bill, I want this board ripped, take it down to the other saw.' They go down to the other saw, which probably has a standard guard on it, one that the company purchased, and it works fine for that job. Another man comes along and says, 'I have to get a tenet cut in.' Away goes the guard, because he cannot cut the tenet with that guard. He shoves out the fence. The next man will turn from a rip to a cross-cut saw. One of the men wants a dado head or a tenet. The man in charge of that department is not going to keep switching his dado heads; instead of that, he switches the guard off the saw, and starts to cut on that."

With the old type of saw, having a one-cylinder mandrel, especially if it is a rip saw, putting a splitter back of the saw is the best safeguard available. Eighty per cent of the accidents on rip saws occur when the man puts his hand back of the saw to remove the material.

The wood-working department of Dodge Brothers has what it considers a satisfactory guard for a dado saw. A form was made for the man to work through, and Mr. Ray, the safety engineer of the firm, thinks that a lot of accident prevention work can be done by arranging forms and giving the men proper push sticks for handling the work that is going through the saw. A company in Grand Rapids has a sliding section on its fence. When the handle is taken hold of and pushed over, it clamps this section on the back of the board, so that when a man pushes the work through he pushes a section of the fence and carries it through.

At the Willys-Overland plant they have Surety guards on some of their saws, but they found that these clog up the plant. They put a block on the rear end guard and the Surety slides back from the saw about 45 deg., but it is rather frail. It was found that it pushed into the saw and cut through the hood. Yet it is more satisfactory than any other guard tried.



Left—Hot saw with guard and water pan for sparks. Right—Guard placed around the end of revolving bar of stock in a machine on the main alleyway where traffic and visitors pass through (Reo)

The FORUM

Criticises Howard Engine

By C. J. Schipplock

REFERRING to the Howard design of twelve-cylinder aviation motor, description of which is contained on pages 681 and 682 of the Oct. 18, 1917, issue of AUTOMOTIVE INDUSTRIES, the writer is hereby taking the liberty of calling attention to a criticism which in his opinion can be duly made of the design of the main drive in that the overhang of the pinion on the crankshaft which engages with the gear on the propeller shaft is so great that it introduces considerable chance for failure to occur at this point under working conditions. Inasmuch as this overhanging pinion is called upon to transmit the full working power of the motor with nothing to balance any tendency of the pinion to whip but the rigidity of the crankshaft supported on the self-aligning bearing, and as it is a known fact that the majority of crankshafts tend to spring out of line more or less under high speeds, which a self-aligning bearing could not prevent, we do not think this safe nor of practical value for an aviation engine, even though the crankshaft itself be made extra heavy at this point.

Engine Supporting Methods

By C. S. Crawford

Chief Engineer Premier Motors Corp.

I AM inclosing herewith blueprint C-3214 showing a diagram of our engine support, together with various details used in making this support. The engine hanger straps, both front and rear, as you will note, are made of Halcomb spring steel and are heat treated. We have found this method of engine suspension the most serviceable we have ever had any experience with. There is just enough flexibility in the job to take all the strain off the crankcase and at the same time there is not the rocking of the engine in the frame such as is found in three point suspension.

I was very much interested in your article in AUTOMOTIVE INDUSTRIES under date of October 18 and inasmuch as you do not show any mountings of a similar nature, I am wondering whether you would care to show the diagram which we are mailing herewith.

Indicator Cards with Water Injection

By J. P. Fairbank

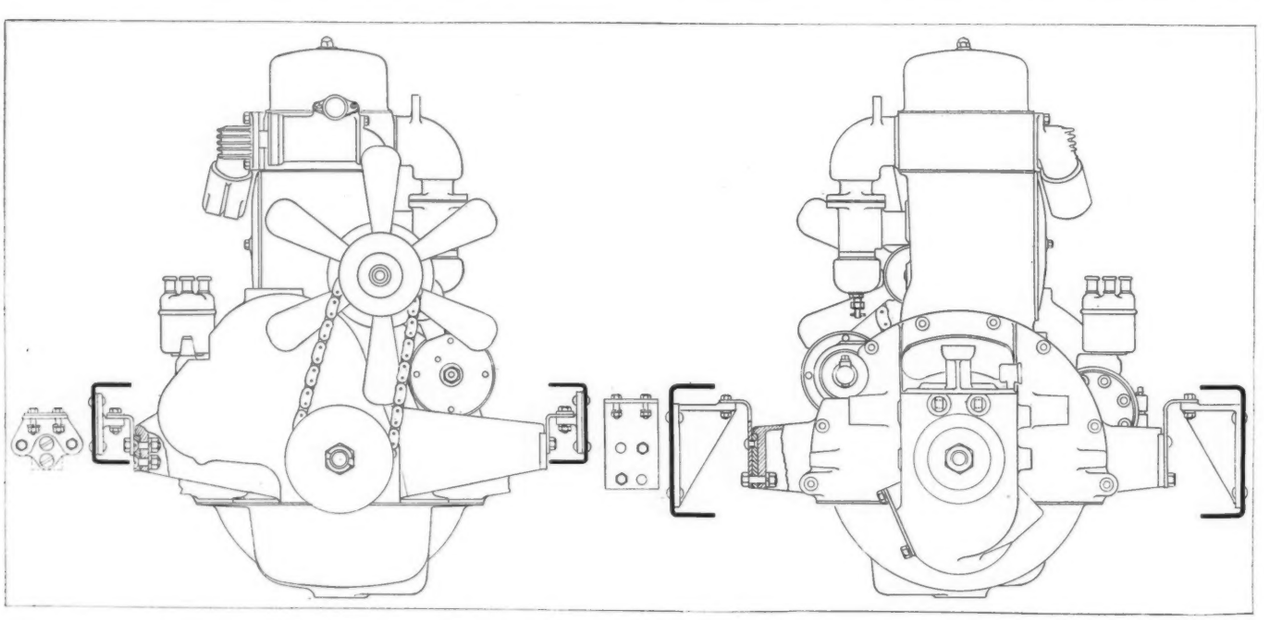
Instructor in Agricultural Engineering

J. EDWARD SCHIPPER, in his article on "Water Injection May Increase Power," which appeared in AUTOMOTIVE INDUSTRIES for Nov. 15, states that you have no record of indicator cards being taken on an engine burning kerosene with and without water injection.

While making a comparative test of the gasoline and the kerosene consumption of a 6-hp. 525 r.p.m. stationary engine at the University of Nebraska in the spring of 1915 the writer took indicator cards while the engine was burning kerosene with and without the addition of water by means of a jet in the mixing valve. The engine pounded or knocked violently when running at full load on kerosene with no water injection. Indicator cards taken at this time showed very high initial pressures, around 400 lb. to the square inch. The expansion curve was very ragged or irregular, resembling harmonic vibrations, which rapidly died out as they approached the end of the stroke. It is quite probable that these irregularities were due to vibrations in the indicator caused by the severe impulses given at the time of ignition.

Cards taken immediately after, with all conditions the same except that a sufficient quantity of water was injected to stop the pounding, showed lower initial pressures and a smooth expansion line more nearly representing that of a steam engine. The expansion curves did not drop so rapidly with water as without, indicating slower burning.

Incidentally the pounding was overcome in a few trials by opening the kerosene needle valve, thus giving a richer mixture. No cards were taken while the engine was running



Engine support used on Premier chassis

on this rich mixture, but we noticed no appreciable reduction in the brake horsepower.

The cards covering the test are in the hands of Prof. L. F. Seaton, Department of Agricultural Engineering, University of Nebraska, under whose supervision the work was done.

Buggy Ideal of Lightness

By Chas. E. Duryea

I HAVE just read A. Ludlow Clayden's able article on Machining vs. Metal. The first sentence is a ringer, and every designer should be busy reducing weight, for weight requires fuel, and fuel is scarce and still soaring. For years the automobile was bought by the wealthy and their followers, but the future great market lies among the masses of small means. For the cost of operation and maintenance is even more to be considered than first cost, but all three are practically proportionate to pounds of weight and number of parts.

Clayden mentions the cycle as the only vehicle in which the rock bottom of lightness has been reached, but a far better example is found in the American buggy, which has proved itself the best vehicle for many parts of the world because it is so light that it can easily be drawn by one horse and so perfect that it carries regularly its weight—300 to 350 lb.—and on decent roads is often loaded 50 per cent heavier or even double. Both the buggy and the cycle reached their large market and did their best work when they had been trimmed in weight and simplified in design to the limit. The automobile will not be an exception to this experience, despite that at present the tendency is still to add more pieces rather than take off some.

The buggy retained its large wheels and excellent springs and so retained its comfort on bad roads, but every other part was reduced. The cycle used better material and lightened every part. The automobile can save much weight by better sections, deeper beams and more care not to waste material in needless places. This will reduce weight and save material cost without adding to the labor cost. It can save weight by a different design. At the last automobile show we saw a car which had the entire transmission and drive on the front axle just under the engine. Such a car could be very light throughout the remainder of its structure.

Certainly there is no warrant for making the power 10 ft. away from where it is to be applied to the road. Every needless bearing or foot of shafting between the engine and the rear tires which it propels adds to the friction, weight, cost and trouble. There is no good reason why the engine should not be at the rear axle. With such a design it is possible to build cars which weigh no more than their full load. Such cars need but a small engine, and such small engines do not need self-starters, nor water cooling.

Much can be gained by using smaller bodies. The horse buggies use seats which overhang the body sides, and the users find ample room for their feet in the narrow and light body. Automobile tops are usually supported by irons enough to pull a freight train, which, being covered by the trimming, pass without criticism, but the buggy trade supplied beautiful drop forgings or light malleables for such duties.

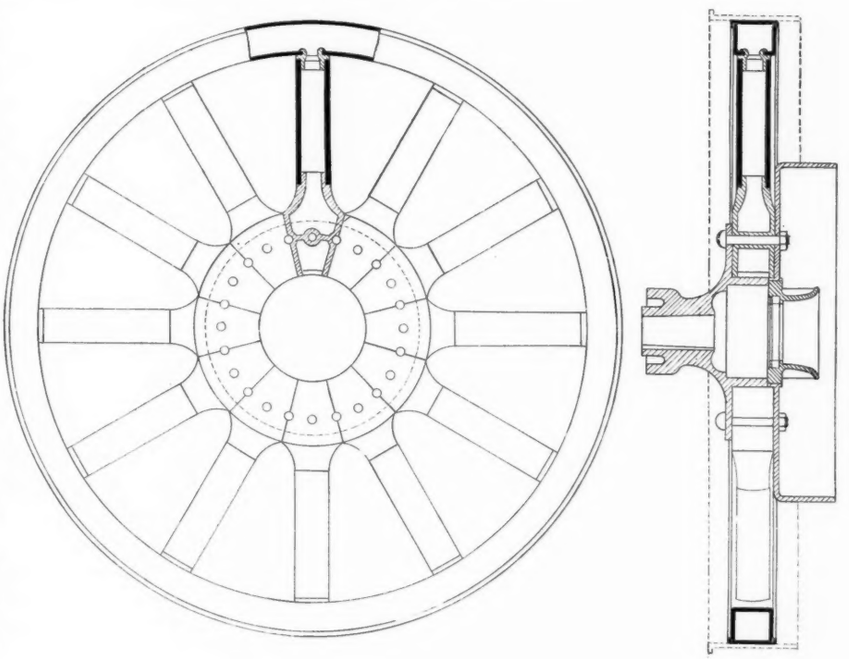
Engines for Export

AN inquiry has been received by THE AUTOMOBILE AND AUTOMOTIVE INDUSTRIES from a Japanese firm of importers for water-cooled gasoline engines of 10-15 hp., either two or four-cylinder, with magneto, carbureter, flywheel, clutch and generator (if possible) complete; also for air-cooled gasoline engines of 5-10 hp., single or double cylinder, with magneto, carbureter, flywheel and clutch complete. It is the intention of the firm making the inquiry to use these engines for motorcycles for carrying parcels. Manufacturers who can supply engines of the types specified can obtain the name and address of the inquirer from our office.

Steel Wheel on Wood Wheel Lines

THE All-Steel Wheel Co., Philadelphia, is preparing to manufacture a steel wheel of built-up construction which in appearance is almost identical with a wood wheel. The accompanying illustration makes the construction perfectly clear. Each of the shanks or wedge shaped ends of the spokes are steel castings, but these could be drop forgings and it is possible to make them either individually as shown or to cast or forge the whole set in one integral portion. The tubular steel spokes are welded in place and the nipple at the upper end which secures the felloe is afterwards peened over so as to hold the rim absolutely. It will be noticed in the sectional drawing that the rim is of a rectangular box section and the tire carrying rim is, of course, fitted outside this. The drawing from which the cut was made is for a truck wheel to take a pressed on solid tire. The company states that on large quantities it believes it can compete favorable with good wood wheels on price.

In some respects this wheel seems to be of simpler construction than the more usual type of all-metal wheel, in which there are commonly great lengths of welding. In this wheel the welds are all short, and should be fairly easy to make. Probably, too, the wheel could be at least as light as, if not lighter than, a wood wheel of equivalent size.



AUTOMOTIVE INDUSTRIES
The Automobile

PUBLISHED WEEKLY
Copyright 1917 by the Class Journal Co.

Vol. XXXVII Thursday, December 6, 1917 No. 23

THE CLASS JOURNAL COMPANY
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SUBSCRIPTION RATES

United States and Mexico	One Year,	$3.00
Canada	One Year,	5.00
Foreign Countries	One Year,	6.00

To Subscribers—Do not send money by ordinary mail. Remit by Draft, Post-Office or Express Money Order or Register your letter.

Owned by United Publishers Corporation, Address 243 West 39th St., New York; H. M. Swetland, President; Charles G. Phillips, Vice-President; W. H. Taylor, Treasurer; A. C. Pearson, Secretary.

Entered as second-class matter Jan. 2, 1903, at the post-office at New York, New York, under the Act of March 3, 1879.

Member of the Audit Bureau of Circulations.

Automotive Industries-The Automobile is a consolidation of The Automobile (monthly) and the Motor Review (weekly), May, 1902, Dealer and Repairman (monthly), October, 1903, and the Automobile Magazine (monthly), July, 1907.

Labor Dilution

THE scientific dilution of labor as carried out in England, so as to make the best possible use of the limited supply of skilled labor, probably establishes a principle which will last forever. American manufacturers have for long past made use of unskilled labor to the greatest extent they thought possible, but what has been done in England under stress of necessity surpasses by far anything that America has seen as yet.

While the British government has promised labor that everything will be put back on the old basis after the war, it is to be doubted if labor itself will ask for a return to pre-war conditions in their entirety. British labor has been earning more than it ever dreamed of doing. Were it not for the agreements as to prices to be paid wages would have gone higher still. Too high a wage when almost all are engaged on munitions work would be disadvantageous to the country, hence the agreement, but in time of peace the continuance of the present British system without the wage restriction would seem likely to return more to the worker than the union rates could hope to do.

Of course there are thousands of women working in British factories who will quit when the patriotic need ends, but they will be replaced by male unskilled workers from the disbanded armies. If the war lasts as long as is generally expected the labor conditions here will be similar to those in England, if perhaps a little less intense. So it is likely that labor all over the Allied countries will have gained an experience of new working conditions quite different from any scheme ever offered by labor leader or employer.

Governments once having administered both ends of production, both labor and capital will or should be better able to develop their countries' industrial lives. It is to be expected that labor troubles, and that monopolist troubles, will be less after the war than before it. In a word it is to be expected that the national efficiency of all countries will be greater.

The number of old ideas that have been destroyed, the number of new ideas that are growing up is prodigious. It is hard to realize how quickly and how completely opinions are changing. When we wake from the nightmare of these years of war we shall find ourselves in surroundings that bear only a slight resemblance to those we last saw when looking wide-eyed over a peaceful world.

Truck Lighting

TWO ways are open to the solution of the truck-lighting problem, and experiments now being made indicate that both will be successfully reached at about the same time. The first is through improvement of the present storage battery, the generator being retained as at present. By the second method the storage battery is discarded and a constant voltage generator used.

Truck manufacturers are showing an increasing interest in electric lighting equipment, and their instructions to the equipment manufacturers show the same division into two schools as outlined above. Some state that failure of the storage battery in the past, in truck work, has been due primarily to poor design, and secondly to poor installation.

In design, the conventional storage battery comprises a set of heavy lead plates held in a vulcanized rubber case. At the bottom these plates rest on several rubber partitions, and they are held down from the top by the cell cover, which is simply sealed in place. Under vibration these plates work back and forth, cutting into the partitions at the bottom and breaking the cover at the top; whence the battery fails.

The improvement forthcoming will be in the nature of making the battery smaller and in fastening the plates so securely to the cell case that they cannot work loose, relieving the top and bottom from strain. In addition, some sort of a spring suspension may be necessary to still further reduce the vibration effects.

Exponents of the other lighting system school claim that the storage battery has no place on a truck, and the slight disadvantage due to not having lights when the engine is idle is more than offset by the freedom from trouble due to the elimination of

the storage battery. Whether the regulator necessary for perfect voltage regulation will not of itself introduce other troubles is something that only test in actual use by the truck owner can show.

Chassis Lubrication

WHAT has become of all the agitation toward the improvement of chassis lubrication? A year ago, through the efforts of prominent automobile engineers, this subject was stirred up, and for a time it looked as if results really would be accomplished. Probably due to the war, attention has been diverted from this important feature in design, and interest has been allowed to subside for the time being. It is a matter, however, which should not be forgotten, as neglect of chassis lubrication on the part of car owners throughout the country is one of the big factors that is shortening the life of automobiles.

So far, the Fergus car is the only thing we have seen which really appeared to carry this development out to any extent. In spite of shortcomings the system on this car was a long step in the right direction, and the interest exhibited by many of the automobile engineers in this country showed that the need for some such oil-distributing system is well recognized.

One of the results of the agitation has been the adoption of oil lubrication in place of grease lubrication on some spring shackles, but these have to have attention just as often as the grease cups do; and while they may be better from the standpoints of cleanliness and of positive lubrication, nevertheless they fall short, because they are subject to the whim of the owner or driver. This feature of chassis lubrication is a matter which must have attention before long if this part of automobile design is going to be on a par with the rest of the car.

It is true that we want to make chassis lubrication as simple as possible, but at the same time it is really a step in the direction of simplicity to add a few parts, if by so doing such an important function as chassis lubrication is made at least semi-automatic.

Heavy Fuels

SLOWLY, but surely, progress is being made towards the use of reasonably heavy fuels in automotive engines. Looking over the past year we see the growth of the idea that a passenger car engine must have some temperature control which will govern the conditions within the manifold. Similarly the water jacket temperature control is rapidly gaining. It is quite safe to say that in another year there will be hardly a passenger and hardly a truck which is not "governed" in some way on both gaseous and water temperatures.

This means that the fuel is compelling the addition to automobile makeup of new devices. It means that the accuracy of vaporization is being increased, that the fuel system of automobile engines will in future be less haphazard than in the past. Really it is not too much to say that it marks a big step forward towards economy of operation. It operates in the direction of scientific power production.

The automobile service which has become so vital to the world is costing it in fuel at least twice as much as it should do. It is costing too much because the thermal efficiency of automobile engines is such a miserable figure, and it is costing too much because such a highly refined fuel is the only one possible.

Some day automobiles may run on crude oil. If they do it is highly improbable that the change from gasoline to crude will be sudden. More likely it will take years. This year the first real step has been taken towards the *economical* development of the automobile.

French Industry

WHAT is the French automobile industry going to do with its enormously increased plants when the orders for war material cease? This is a question which is being asked in France and is not yet answered. France, like England, is now furnished with factories and equipment for manufacture greatly in excess of the pre-war condition. To what use can all these be put in the future?

In the automotive field two things are probable. First it is certain that aviation development is not going to cease with the war, rather is it likely to be maintained at almost the same pace as commercial uses are found for planes. France is a pre-eminent producer of airplanes and aviation engines, and no doubt will be able to export quantities of aircraft. The French ability to produce parts of a very high accuracy will always find scope in the aviation field.

Next there is the truck business in which France was lagging behind a good deal in 1914. It is admitted by French engineers that their trucks were not as good as British and American trucks. Lately things have changed, and there are now some excellent heavy vehicles being made in France. Also it must be remembered that French engineers have had even better opportunity than Americans to study the types of all nations in war service; so they ought to be in a position to design excellent machines of their own.

More problematical, but still probable, is the growth of a tractor industry in France. French farming is now conducted in a manner which makes tractor application difficult, because the innumerable small landholders are mostly far too poor to purchase any machinery. It is not unusual to see a French peasant using a hay rake made from odd bits of wood instead of the proper article because he cannot afford the few francs needed to purchase the more efficient tool.

Thus the French tractor industry would seem to depend upon a reorganization of the present system of farming in minute patches. That some readjustment is possible there is no doubt, nor is there any doubt that France will make big changes if their necessity becomes sufficiently great.

□ Latest News of the

More Than a Billion for Aviation

Chief Signal Officer Squier Asks for $1,032,294,260 for Aviation Program

WASHINGTON, Dec. 5—More than one billion dollars is to be spent by the Government during 1919 on the air equipment of the United States army and navy. In the "Book of Estimates" presented by Secretary of the Treasury McAdoo, to the Congress, Chief Signal Officer Major-General Squier has asked for a total of $1,138,240,318.77. This appropriation is in addition to the $640,000,000 already allowed, and $1,032,294,260 is to be used exclusively for the aviation section; the remainder, $105,946,057.77, is for other objects in which the signal section is interested.

The principal items in the more-than-a-billion appropriation for aviation are $553,289,120 for spare engines and parts, $235,866,000 for airplanes and hydroplanes, and $77,475,000 for guns for airplanes. The other items in detail are:

(*Continued on page 1026*)

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Plan War Council Dec. 12

WASHINGTON, D. C., Dec. 3—The Chamber of Commerce of the United States has issued a call to the chairmen of the war service committees representing the various industries of the country to attend a meeting Dec. 12. The chairmen will work primarily to perfect plans for co-operation with the Government and will discuss many of the vital problems with which all industries are confronted during the war.

—

War Contracts for Many Makers

NEW YORK CITY, Dec. 5—Additional contracts are almost every day reaching the automobile field, and rumors are rife as to many others that are being placed. A local financial paper carries the report, which it is impossible to confirm, that Willys-Overland Co. has a government order, which has been reported in New York financial papers, amounting to $20,000,000 on government standardized war trucks. F. B. Stearns Co. has a contract from the British government for the manufacture of parts for the Rolls-Royce engine. It is also reported that several other concerns have contracts to make parts for these engines. In this connection it is understood that Rolls-Royce was not agreeable to having to having its engines manufactured entirely by any American concern, and that this is being accomplished by manufacturing parts in different American factories and having them assembled in England.

—

Truck Pathfinder Reaches Washington

WASHINGTON, D. C., Dec. 3—H. C. Osterman, driving the pathfinder car for the Highway Transport Committee, arrived here last night following a 10 day journey during which the party tested every road and route of consequence between Detroit and the eastern seaboard from which the war trucks will be shipped to Europe. The entire journey as finally laid out will make a trip for the trucks of 565 miles.

—

Truck Makers in Washington

WASHINGTON, Dec. 4—Between 40 and 50 members of the automobile industry are in Washington to-day at the Military Truck Production Board, where assembly contracts will be discussed and arranged for assembly of the Class B heavy duty war trucks. Among the makers here are T. D. Barney of the United Motors Co., Arthur T. Murray of the Bethlehem Motor Truck Co., O. E. Stolt, General Motor Truck Co., and E. O. Suton, Knox Motor Truck Co. A list of those receiving contracts will be issued within the next few days.

—

Resign to Facilitate War Work

WASHINGTON, D. C, Dec. 4—Members of several sub-committees of the Council of National Defense, including the Automotive Products Committee, have tendered their resignations to the Director of the Council. H. L. Horning, chairman of the Automotive Products Section and the accredited representative of the War Industries Board on all matters automotive, retains his chairmanship and continues to represent the War Industries Board. The members have resigned in order to avoid any embarrassing situations that might arise since the War Industries Board took over supervision of these committees from the Advisory Commission of the Council. Members of various industries felt that they might be a hindrance to direct activities on the part of the War Board in regard to priorities and other orders relating to temporary curtailment or classifications as regarded their particular industries.

—

Crawford Heads Premier Production

INDIANAPOLIS, Dec. 6 — Charles S. Crawford, formerly associate chief engineer of the Premier Motor Car Co., Indianapolis, has been promoted to the post of assistant general manager of the company, in charge of production.

Ford Must Distribute $19,275,385

Cannot Operate Blast Furnaces and Must Refund All Money Spent on Them

DETROIT, Dec. 6—The courts have blocked the Ford Motor Co.'s plan to establish extensive blast furnaces on the River Rouge, and decreed that a dividend amounting to $19,275,385 must be declared at once. This is the final decision of Judge Hosmer in the Dodge-Ford suit. The original decree stated that one-half of the accumulated profits of the Ford company on hand July 31, 1916, after the deduction of special dividends delared since then, should be distributed to stockholders. In the new decision it is further held that the Ford Motor Co. may not hereafter accumulate profits "in excess of such as may be reasonably required in the conduct of the business."

Although the River Rouge project is blocked insofar as the Ford Motor Co. is concerned, it is believed that it will be carried to conclusion by Henry Ford himself. In the meantime, however, the Ford Motor Co. is required to refund all money so far expended on it; early in the suit a bond of $10,000,000 was filed by three of the Ford directors for such an emergency. An accounting must be made within 30 days, and within 90 days all money spent on the project must be refunded. The costs of the suit have been taxed against the individual defendants named in the suit, Henry Ford, Edsel B. Ford, Frank L. Klingensmith and Horace M. Rackham and not against the Ford company.

—

Furniture Makers Band Together for Airplane Production

GRAND RAPIDS, MICH., Dec. 3—The Grand Rapids Airplane Co has been organized with a capital of $200,000 at a meeting of furniture manufacturers. It is expected that practically all of the furniture factories in the city will receive orders on the parts entering into the airplane construction. Work will be started as soon as material is available. The following are the officers of the company: President, Samuel D. Young, of the Grand Rapids Show Case Co.; vice-president, F. S. Foote, of the Imperial Furniture Co.; treasurer, J. H. Hoult, of the Luce Furniture Co.; secretary, C. C. Kustere, of the Stickley Brothers Furniture Co. Directors include the officers and B. A. Hathaway, Norman McClave, and R. W. Irwin.

Automotive Industries

LaborSurveyCouncil Is Formed

Marshall Heads New Body Which Will Co-ordinate Supply and Demand

WASHINGTON, D. C., Dec. 1—L. C. Marshall, dean of the school of commerce and administration of the University of Chicago, has been named as chief of a newly created committee of the Council of National Defense to handle preliminary investigation in the many existing labor problems. The committee will have four main objects:

1—Determination of present and future labor demands of war industries.
2—Determination in connection with priorities committee of the relative priorities of labor demand.
3—Arrangement through Department of Labor for supply of demand for labor or through such governmental or civilian agencies as can best meet the demand.
4—Determination of the necessary dilution of labor, including the introduction of women into industry.

Following investigation by this committee, which will be completely named in the near future, the council will look to representatives of the workers to supply the available men.

The committee will have no executive powers, but will merely gather data for the Council. Conscription of labor is to be avoided both in thought and action, and employment agencies will be utilized as the only medium other than co-operation from the workers themselves to supply the demand for labor.

Up to this time the only serious shortage for labor has been found in shipyards, and railroads and all other munitions plants or war industries have found an ample supply of workers to meet their requirements.

—

Automobile Committee Adds to Organization

WASHINGTON, D. C., Nov. 30—The Automobile Industries Committee has engaged W. D. Rockwell, sales director of the Universal Machine Co., Bowling Green, Ohio, as the manager of the committee, and has placed in the organization as investigating engineers C. M. McFarland of the Jackson Rim Co.; F. H. Kane, chief draftsman, Oakland Motor Car Co.; A. J. Platts, supervisor of tools, Maxwell Motor Co.; H. J. Woolson, engineer, Studebaker Corp.; Don Cole, chief engineer, Stromberg Carbureter Co.; P. A. Bofinger, Columbia Motors Co., Detroit, and William Gaines, Inter-State Motor Co. Other engineers who will investigate motor car plants for the committee will be appointed and announced later.

—

Steel Men Visit East

NEW YORK, Dec. 3—The American Steel Export Co., New York, has sent E. W. Ames, manager of agencies, and A. G. Dowden, assistant purchasing agent, on a trip which will cover the whole of the Far East. They will study conditions with a view to after war trade.

—

To Rescind Order Against Transportation of Gravel

RICHMOND, W. VA., Dec. 5—The American Association of State Highway Officials closed its annual meeting here today, particularly cheerful because of the message conveyed from Judge Lovett of the Priorities Board of the Council of National Defense by Roy Chapin, chairman of the Highway Transportation Committee, to the effect that the Priority Order No. 2 prohibiting the use of open-top freight cars for hauling gravel will be rescinded by very early spring from present indications.

—

Represent Overland in Washington

WASHINGTON, D. C., Dec. 5—C. W. McKinley, consulting engineer for the Willys-Overland Co., has been detailed to this city to work with E. C. Morse, Willys-Overland representative here, on all matters regarding Government affairs in which the Willys-Overland Co. is interested.

Expects New Tanker Shortage

Shipbuilding Program Includes No Tankships—500,000 Added Since 1915

NEW YORK, Dec. 5—The Shipping Board is placing no orders for tankships and will permit no orders to be placed by private concerns. This is likely to create a shortage in tankship tonnage despite the great increase in capacity since 1915 in the opinion of Robert W. Morrell, who presented a paper dealing with the question before the Society of Mechanical Engineers to-day.

Morrell states that since 1915, 57 tank steamers have been built in the United States of 371,900 gross tons and this makes the gross tonnage of American-owned tankers 823,200 with a carrying capacity of 1,180,000 tons. This means that since the war the carrying capacity has increased 185 per cent. Sixty-four more ships are now building with a capacity of 575,750 tons.

War has not caused any enormous loss of tankships, according to Morrell, who says that the total number lost due to war causes is only six. The paper which includes these statistics is mainly devoted to the design of tank ships, and points out that there is a tendency to increase the size considerably. The largest vessel of this class afloat is the Jupiter with capacity for 17,000 tons of oil, this being a German built boat under American ownership.

War Work Bringing Extensive Rearrangement

DETROIT, Dec. 1—The factories in this vicinity are undergoing a period of change. A great many have just begun to get releases on war orders and are changing the routing of the factories so that the war order production and regular commercial production will not clash. This has naturally caused a rearrangement of the plants to accommodate them to the double work.

With $500,000,000 worth of war work placed in Detroit and vicinity, the factories here are undergoing a period of intense activity. The normal volume of business from the manufacturing standpoint is more than doubled by taking in the new war work, and it will not be more than a few weeks longer before this is under full swing. During the interval there is a lull in the labor situation, so that it is now comparatively easy to get men in fields where it was practically impossible a few weeks ago. However, this situation is due to pass very quickly.

It is difficult to get good time-study men and men capable of being foremen of sub-departments; that is, men who are exceptionally skilled along certain lines of machine shop and other work requiring special training.

The material situation is easier than a week ago. Some difficulties, however, which have not been foreseen have cropped up even in war orders. One instance of this is a shortage of seamless steel tubing which has been specified by the Government for certain parts of the Class B truck engines. A great demand for this tubing for work under the Class A 1 priority schedule has caused a shortage, which has been met by the Government permitting the use of welded tubing in its place in certain parts. The companies manufacturing Government supplies and munitions, which are operating

under the Class A 1 schedule, have duplicated in so many of their requirements that it will probably be necessary for the Government to subdivide the Class 1 priority schedule in order to establish a correct working order of shipments.

The parts manufacturers have been rather agreeably surprised at the way the assembled car business is holding up. One of the largest engine manufacturers in Detroit is building 258 passenger car engines a day. The normal schedule would be about 350 at this time of the year. This reduction, however, is one that has held for some months and is not below what it was a month ago. The assembled car business, in view of the situation, is remarkably steady, and there is no tendency toward a slump at the present time; in fact, with the atmosphere clearing as regards materials and the reassuring words of parts and complete car manufacturers regarding ability to manufacture even if alloy steels were practically all cut off, there has been a new note of confidence in the industry.

—

U. S. Rubber War Orders Total $5,000,000

NEW YORK, Dec. 1—The United States Rubber Co. has war orders totaling nearly $5,000,000. A portion of this business is for the French Government. Tire business during the current year will amount to $55,000,000, about 35 per cent of its entire business. On the basis of earnings for the 11 months ended Nov. 30, the company will show a minimum net for the full year of $15,000,000 after an allowance of $1,000,000 for special war taxes. Preferred dividends for the year will take $4,800,000, which will leave at least $10,200,000 for the $36,000,000 common stock, or approximately $20 a share. These earnings are the largest in the history of the company and compare with $15.12 a share earned on the same amount of stock a year ago.

—

Wisconsin Tractor to Enlarge

SAUK CITY, WIS., Dec. 3—The Wisconsin Tractor Co., Sauk City, Wis., established about a year ago by McFarland & Westmont, Lodi, Wis., in the plant erected at Sauk City for the use of the Shaw Motor Co., but never occupied, has incorporated its business with a capital stock of $100,000 under the name of Wisconsin Farm Tractor Co. Local interests who bought stock in the Shaw company to construct the plant are receiving shares in the Wisconsin company, which thus becomes possessor of the real estate and buildings. The output of all-steel tractors for farm and general haulage purposes is being greatly enlarged.

—

Grant Prices Higher

CLEVELAND, Nov. 26—The prices of the 1918 model G cars manufactured by the Grant Motor Car Corp. are as follows:

Style	New Price	Old Price
Touring Car	$1,055	$875
Roadster	1,055	875
Detachable Sedan Touring Car	1,350	...
All-weather Sedan Touring Car	1,595	...
All-weather Sedan Coupe	1,575	...

Boston Space Given Accessory Men

30 Members of the Motor and Accessory Assn. Make Reservations

NEW YORK, Nov. 30—The following members of the Motor & Accessory Assn. have taken space at the Boston show which will be held March 2 to 9 at the Mechanics Bldg., under the auspices of the Boston Automobile Dealers Assn. They are as follows:

Auto Pedal Pump Sales Corp.....New York
Brunner Mfg. Co.....Utica, N. Y.
Champion Ignition Co.....Flint, Mich.
Corcoran-Victor Co.....Cincinnati
Corning Glass Works.....Corning, N. Y.
Detroit Pressed Steel Co.....Detroit
Dixon Crucible Co., Jos.....Jersey City
Doehler Die-Casting Co.....Brooklyn
Du Bois Piston Ring Co., Inc.....Albany
Electric Storage Battery Co.....Philadelphia
Gray & Davis, Inc.....Boston
L. P. Halladay Co.....Streator, Ill.
Harris Oil Co., A. W.....Providence, R. I.
Hartford, Inc., Edward V.....Jersey City
Kellogg Mfg. Co.....Rochester, N. Y.
Kent Mfg. Works, Atwater.....Philadelphia
Mann Co., F. W.....Milford, Mass.
Metal Stamping Co.....Long Island City
Mosler & Co., A. R.....Mt. Vernon, N. Y.
Moto-Meter Co., Inc., The...Long Island City
Piel Co., The G.....Long Island City
Rowe Calk Co.....Hartford, Conn.
Century-Plainfield Tire Co...Plainfield, N. J.
Schrader's Son, Inc.....Brooklyn
Syracuse Malleable, Iron Works, Syracuse, N. Y.
Vacuum Oil Co.....New York
Veeder Mfg. Co., The.....Hartford, Conn.
West Side Foundry Co.....Troy, N. Y.
Rand Mfg. Co., Inc.....Haverhill, Mass.
Warner-Lenz Co. .....Chicago

—

Strom Passes Great Divide

NEW YORK, Dec. 2—A. A. Strom, president of the U. S. Ball Bearing Mfg. Co., Chicago, died here last week at the Waldorf. He had been suffering from slight attacks of heart trouble and death came while waiting for a business conference. Mr. Strom made his greatest life work the development of a heavy railway supply business which he controlled. The present ball-bearing business was started for his sons, both of whom, George A. and Eugene N., are members of the board of directors; Walter H. Strom is secretary and treasurer and general manager of the organization. Mr. Strom was not one of the active spirits in the ball bearing company but acted only in an advisory capacity, the business being handled directly by the boys.

—

Mason Earns 20 Per Cent

KENT, OHIO, Dec. 3—The annual report of the Mason Tire & Rubber Co. for the year ending October 31 shows gross sales exceeding $1,200,000 and total and profits of $181,504. Deductions for income tax reserve, preferred dividends and preferred dividend reserve leave a surplus balance of $104,330. This is practically 20 per cent on the common stock. The preferred stock has been increased in par value from $10 to $100. The following directors were elected: O. M. Mason, D. M. Mason, D. N. Mason, John H. Diehl, and R. W. MacKinnon, and the following officers were re-elected: president, O. M. Mason; treasurer and general manager, D. M. Mason; secretary, R. W. MacKinnon.

—

600 Akron Firms Out of Electric Power

AKRON, Dec. 2—With only 4 days supply of coal on hand, the Northern Ohio Traction & Light has been forced to notify nearly 600 industrial establishments that electricity for power purposes must be discontinued. However, the Goodrich, Firestone and Miller rubber plants will not be affected, as these companies have coal of their own, and are loaning it to the power company. The Goodyear Tire & Rubber Co. likewise has a power plant and coal of its own.

—

Staude Mak-a-Tractor Enlarging

ST. PAUL, Dec. 3—The E. G. Staude Mfg. Co. has reorganized, filing articles of incorporation at Pierre, S. D., and increasing its capital from $150,000 to $5,000,000. The company expects to make 50,000 Mak-a-Tractors, between Jan. 15 and Oct. 1, 1918. Before next April $500,000 is to be expended enlarging the plant, which is on the Twin Cities midway line. B. J. Cassaday of Minneapolis was elected vice-president. Other officers were re-elected.

—

Mitchell Motors Passes Dividend

RACINE, WIS., Nov. 30—The Mitchell Motors Co. has passed the usual quarterly dividends of $1.50 a share. The company recently received a Government order for Four Wheel Drive trucks through the Four Wheel Drive Co., Clintonville, which has licensed it to take care of the contract. This contract will require substantial working capital and suspension of the dividend is decided upon by the directors in order to conserve the cash resources of the company.

In the fiscal year ended Oct. 31 last, profits are estimated to have been between $1,100,000 and $1,200,000, which is equivalent to about $9.50 a share. Output of cars in the period was about 12,000. Profits in 1916 were $1,188,398, equal to $9.50 per share. The output was 11,000 cars.

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Miller Tool in New Building

DETROIT, Nov. 28—The Miller Tool & Mfg. Co. is now in a two-story building at Sixteenth and Newark Streets, the quarters providing almost 100 per cent more floor space. Formerly small automobile parts were manufactured, but new machinery has made it possible to manufacture tool equipment for car or tractor manufacturers.

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NEW YORK, Nov. 30—The Fahrig Metal Co. has opened its new plant at 188 First Street, Jersey City. The new plant will enable the company to double its production.

Munger Wins Rim Patent Suit

Court Holds He Is Still Owner of Rights—Affirms Right to Royalties

NEW YORK, Dec. 3—The dispute as to whether Louis De F. Munger owns his rim patent has been settled in favor of Munger. He brought suit against the Perlman Rim Corp. on his patent No. 638,588, and litigation was progressing nicely when the Perlman company charged that Munger did not own the patent. The court holds that a conditional assignment of the patent was made some time ago, but that title never passed because the conditions were not fulfilled, thus leaving Munger still the owner of the patent. He is also reaffirmed in his right to collect royalties under his patent.

Saxon Southern Business Brisk

DETROIT, Nov. 26—The Saxon Motor Car Corp. reports an exceptionally good Southern business. The Stoutz Motor Co., New Orleans, has ordered eighteen carloads for immediate shipment to its dealers, stating that unless they could be secured it would be necessary for the dealers to take on additional lines. The J. C. Lewis Motor Co., Atlanta, Ga., has wired for 335 cars on immediate shipment, and the Memphis Motor Car Co., Memphis, Tenn., and the Oklahoma Saxon Co., Oklahoma City, Okla., are also doing a good business.

Takes On Rudge-Whitworth Wheels

PHILADELPHIA, Nov. 30—The Bearings Co. of Pennsylvania at 684 North Broad Street has taken on the sale of Rudge-Whitworth wire wheels with jurisdiction over the service in New York, Philadelphia, Baltimore and Washington.

G. V. Electric Trucks to Be Continued

LONG ISLAND CITY, Nov. 30—The General Vehicle Co. will continue the manufacture of electric trucks, notwithstanding the fact that a considerable portion of the local plant will be devoted to other work.

McCord Enters Forced Feed Lubricator Field for Marine Engines

DETROIT, Dec. 1—The McCord Mfg. Co., which in the past has manufactured radiators, and at present is turning out radiators on Government order, is entering the forced feed lubricator field, for marine engine work.

Collier Truck Moves to Bellevue

BELLEVUE, OHIO, Dec. 1—The Collier Motor Truck Co. has moved to this city from Cleveland, and R. A. Palmer, formerly of the Pontiac Chassis Co., Pontiac, Mich., is in charge of production. This company manufactures a 1500-lb. truck selling for $885 complete, with a choice of any one of four bodies. It is driven by a 3¼ by 5-in. Lycoming engine, through Salisbury axles having a gear ratio of 6 to 1. The truck is also equipped with Auto-Lite starting and lighting system.

No Heavy Work for Women

HARRISBURG, PA., Nov. 28—At a meeting of the State Welfare and Efficiency Conference the question of women in industry was discussed. It was the opinion of this conference that women should not be called upon to do heavy work. George T. Fonda, of the Bethlehem Steel Co., stated that educational work to prevent accidents was of national importance at this time due to the fact that men are leaving their regular employment and women or men filling their places are not acquainted with the dangers.

More Capital for General Electric

SCHENECTADY, Dec. 3—Directors of the General Electric Co. have voted to increase the stock of the company by $10,000,000. At the same time a special semi-annual stock dividend of 3 per cent on the common is declared, also a quarterly dividend of $2. Stockholders will vote on the stock issue Jan. 3. It will be offered to stockholders at par.

Jordan Shipments Are Normal

CLEVELAND, Dec. 3—During the 24 days from Oct. 20 to Nov. 16 the Jordan Motor Car Co. shipped 153 cars. This is normal production on the 2000-car output planned at the beginning of the year. With this statement of output the company issued an itemization showing a net profit of $30,699.93, or 13.47 per cent.

War Helps Sedan Demand

NEW YORK, Dec. 3—War conditions have made the sedan a more popular selling car than the limousine, according to statements from New York dealers. Sedans are in demand, but it is not so easy to get rid of limousines. Many owners have disposed of their chauffeurs as economy measures and are driving their own cars.

Oakland Buys Out Tennant

CHICAGO, Dec. 1—The Oakland Motor Car Co., Pontiac, has bought the business of the Tennant Oakland Co., Chicago distributer for the Oakland, and W. G. and J. G. Tennant, for fifteen years in the retail automobile trade, have retired from the passenger car business. The change was made when O. F. Berkey, for the last year manager of the Chicago wholesale department, formally took over the showrooms and service station to-day.

The staff of the Tennant Oakland Co., with the exception of the Tennants and K. E. Potter, secretary of the agency, will be retained by the branch. The transfer includes the acquisition by the Oakland plant of the Tennant Oakland transportation line of thirty railroad cars used to move motor cars from the factory at Pontiac to Chicago.

Lincoln Concentrates on War Work

Equipping Plant for Liberty Engines—Plans to Use Women Workers

DETROIT, Nov. 27—Although the plant of the Lincoln Motor Co. now building at West Warren Street is not yet completed, the company is occupying a two-story plant near Holden and Lincoln Streets and is preparing for production of the Liberty engine. This plant is about 100 by 600 ft., and contains the general offices of the company in addition to the shops. The company is now tooling up for the coming production, and it is stated that orders for equipment and tools have been placed in nearly every large machine shop in the country. Contrary to the general belief that skilled labor is plentiful, due to the laying off of men from the automobile plants, H. M. Leland states that such is not the case, and reports that few men are available from that source. It is expected that many women will be employed in this factory when actual production is well under way. The present wage paid averages 45 cents per hour.

It is the plan of this company to concentrate on engine manufacture for the Government for the duration of the war, or for as long as the Government desires. After that no definite plans for production are available.

Pathfinder Brings $59,100

INDIANAPOLIS, Dec. 1—L. Goldstein Sons of Philadelphia have submitted the highest bid for the plant of the Pathfinder Motor Car Co., which was offered for sale here by the receiver. A member of the firm submitted a bid of $59,100 for the plant. Officials of the American Motor Parts Co. of this city said that the company was a part of L. Goldstein Sons, and that the Pathfinder plant probably would be used in connection with the work of the American Motor Parts Co., although representatives of the Philadelphia concern as yet have not authorized such an announcement.

Stone & Sons Co. Plant Destroyed

CHICAGO, Nov. 27—Fire destroyed the C. Stone & Sons Co. body building plant last night. Twenty-five complete cars and 150 bodies went up in smoke. It is stated that the loss amounts to $175,000.

Chicago Factory Branch for United Motors Service

DETROIT, Nov. 26—The United Motors Service, Inc., announces that the Chicago factory branch will occupy a new three-story building at 2715 South Michigan Avenue, and that construction will be started immediately. It is expected that this building will be ready about March 1, and it will provide about 15,000 sq. ft. of space. This company gives service on Delco, Klaxon and Remy equipment.

Form Federal Guard For Factories

Federal Military Force Will Protect All Plants Doing Government Work

WASHINGTON, Nov. 30—A Federal military guard under direct control of the War Department, and so organized as not to conflict in any way with the home guard in the different States, is to be organized for the purpose of protecting automobile and other motor plants, accessory manufacturing plants, steel plants and all other such institutions employed upon government war work. In addition, this Federal military force will protect government buildings and government supplies already purchased.

While it is possible this force will aggregate a total of 100,000 men, and that it will be organized in practically all if not in all of the States, yet first and special attention is to be given those States in which are located industrial plants engaged upon the manufacture of trucks, airplanes, motors generally and various accessories.

This force is to be organized under the direction of Col. Jesse McL. Carter, Chief of Militia Division of the War Department.

In cases of domestic trouble beyond the control of the State authorities application for Federal military aid hereafter will be made direct to the War Department through the adjutant general, instead of the commanding general of the military department in which the trouble is located.

The proposed internal police force will be recruited from men between 19 and 45 years of age, either not subject to the draft or not physically fit for the strenuous life of a soldier on the battle line, but strong enough and sensible enough to use a gun and perform ordinary military duties.

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23,048 War Workers Needed

WASHINGTON, Dec. 6—The Employment Agency of the Department of Labor, after covering thirty-seven cities found that war order firms employing 168,446 persons still need 23,048 additional workers, approximately 57 per cent of the demand being for airplane and seaplane factories.

Additional workers are also needed by ordnance, ammunition, iron and steel castings, machinery, truck and motor vehicle manufacturers. At the same time the Labor Department found that while some firms are expanding their operating forces, other firms in the same industry are laying off employees. This applies to the automobile industry where some makers of parts such as gears and machinery for passenger automobiles are reducing their working forces and makers of passenger cars and trucks are expanding. The survey also found that large numbers of women are replacing men.

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May Urge More Price Fixing

WASHINGTON, D. C., Dec. 5—One result of the President's message to Congress is expected to be the enactment of legislation extending the Government's price-fixing power on the theory that there is an urgent need for absolute control by the Government of prices of commodities; also, an administration measure giving the Government power to fix the price of basic materials including steel and iron, is expected to be pushed. Such a measure failed in the last session.

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Peck on War Board

WASHINGTON, D. C., Dec. 5—George N. Peck, vice-president of Deere & Co., Moline, Ill., and a member of the executive committee of the National Implement & Vehicle Dealers' Association, has been appointed industrial representative of the War Industries Board to direct the conversion of manufacturing facilities for war work. Mr. Peck will meet with manufacturers, according to a statement from him, who have facilities that may be devoted to munitions manufacture and will consider to what extent such plants may or should be used for such purposes and advise the board in the premises.

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Can Plate Aluminum

NEW YORK, Dec. 4—The United Smelting & Aluminum Co., New Haven, Conn., has patented a process for electro-plating aluminum, which is similar to the standard process of electro-plating other metals, and from which uniform results are obtainable. The process is equally applicable to pure aluminum in sheets, rods, wire, tubing, etc., and to aluminum alloyed with other metals, as in molded or die castings.

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$75,550,000 for Armored Cars

WASHINGTON, Dec. 3—In his estimates of appropriations required by the Government during the fiscal year ending June 30, 1919, Secretary of the Treasury McAdoo has asked for an appropriation of $75,550,000 for the purchase, manufacture, test, repair and maintenance of armored motor cars. It is to remain available until the end of the fiscal year 1920.

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To Organize Whole Ohio Trade

COLUMBUS, OHIO, Dec. 5—The Ohio Automobile Trade Association to-day elected A. E. Mitzel of the Canton Motor Car Co. president, raised $15,000 for an extension of association work and has launched a campaign for the formation of trade associations in all sections of the State. A salaried commissioner is to be engaged at once. Much of the financial pledge was furnished by the jobbers of Ohio.

More Exhibitors For National Shows

One Car Maker and Number of Accessory Makers Added for New York and Chicago

NEW YORK, Dec. 4—One more car exhibitor has been added to the list for both the New York and Chicago shows. This is the Templar Motor Corp., Cleveland, Ohio. The following accessory exhibitors have been added to the list:

New York and Chicago

Pratt Mfg. Co., W. E.	Chicago
Sunderman Corp.	Newburgh, N. Y.
Water Gas Carburetter Co.	New York
Wire Wheel Corp. of America	Buffalo
Guarantee Liquid Measure Co.	Pittsburgh
Macbeth-Evans Glass Co.	Pittsburgh
Menominee Electric Products, Inc.	New York
Arrow-Grip Mfg. Co.	Glens Falls, N. Y.
Black & Decker Mfg. Co.	Baltimore
Challoner Co.	Oshkosh

New York Only

Eisemann Magneto Co.	Brooklyn, N. Y.
Fryer-Auster Co.	New York
Kales Stamping Co.	Detroit
Le Compte Co., Geo. W.	New York
Otis Elevator Co.	New York
Peters & Herron Dash Co.	Columbus
Philadelphia Storage Battery Co.	Philadelphia
Rives Never-Slip Auto Pedal Co.	New York
Simmons Mfg. Co.	Cleveland
Sales Service Co.	New York
Titeflex Metal Hose Corp.	New York
Tri-Ton Trailer Corp.	New York
Union Truck Mfg. Co., Inc.	New York
Adams & Elting Co.	Chicago
Art Metal Works	Newark, N. J.
Auto Pedal Pump Sales Corp.	New York
Edward G. Budd Mfg. Co.	Philadelphia
Carburetor Mantle Co.	New York
Coffield Tire Protector Co.	New York

Chicago Only

Air Device Co.	Chicago
Gibralta Jack Co.	New York
Globe Mfg. Co.	Battle Creek
McKinnon Dash Co.	Buffalo
Syracuse Universal Mfg. Co., Inc.	Syracuse

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Used Truck Report Appears

CHICAGO, Dec. 5—The Chicago Automobile Dealers' Association, which for some time has been publishing a National Used Car Market Report giving "As is appraised" values of used passenger cars and average resale prices received by dealers for such cars, has issued its first National Used Truck Market Report. In scope the report is quite similar to the used car report and is intended to be used by dealers for reference in making allowances on used trucks and in selling them.

Books in pocket form, 7 by 4¼ in., bound in semi-stiff green leather, are issued twice a year and loaned on a yearly subscription basis to firms manufacturing or selling motor trucks. The first volume gives the current estimated selling value of all models from 1912 to 1916 of 108 different makes of trucks. Current-year models are listed but not appraised. The Chicago Automobile Trade Association has offices at Michigan Avenue and 22d Street, Chicago.

Military Roads Only in Bay State

No New Roads Connecting Summer Resorts—Existing Roads to Be Widened

BOSTON, Dec. 1—The Massachusetts Highway Commission has decided that it will not build any roads next year that would merely connect up summer resorts, or along scenic routes. Instead the money will be spent upon widening and strengthening the highways between the various cities, and along which military bodies would be moved in case of emergencies. The Commission will not let the scenic routes deteriorate, however, for it realizes that they are a distinct advantage to the State in attracting visitors and in taking a lot of traffic off some of the main highways.

The Commission has no intention of trying to build a strictly military highway with a hard surface of 24 ft. width and wide shoulders on both sides for the passage of infantry. Such construction would cost too much. It is realized that with a war on it will be necessary now to move a lot of freight over the highways that otherwise would go by rail, but cannot be moved due to congestion. So roads to stand this heavy truck traffic will have to be maintained. For more than a year now many big companies have been moving heavy shipments by motor truck. Shipments of 50 and 100 miles are fairly common. This means that wider roads are imperative to prevent accidents due to the width of the big trucks. When peace comes there will be even more trucking, the commission believes. The commission has not decided just what type of construction will be used next year, but it is studying the matter now.

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To Keep Roads Clear

WASHINGTON, Nov. 30—In co-operation with the Highways Transport Committee, the Pennsylvania State highways authorities have decided to keep the roads of the State open all winter. Six large motor snow plows have been placed in service and sent to district points along the main east and west roads of the Lincoln Highway to keep it open for the drive-away of the War Trucks which begins early next year.

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Government Trucks Taxable

WASHINGTON, Dec. 3—The Internal Revenue Department has ruled that cars and trucks sold to the government come under the 3 per cent tax regulation.

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Plan Postal Truck Routes

COLUMBUS, OHIO, Dec. 1—Postmaster Kinnear, following instructions from Washington last week, is planning for the establishment of a parcel post truck delivery service between Columbus and Zanesville, a distance of 57 miles. The parcel post delivery system between Columbus and Zanesville will be among the first which the government proposes to open.

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Rubber Men Aid Government

WASHINGTON, Dec. 4—A special committee of the Rubber Association of America will meet at 10 o'clock this morning in the New Willard Hotel "to study and determine how the association can best assist the government in the war, particularly how to bring about the construction and the utilization of aircraft in overwhelming numbers at the earliest possible date." This resolution creating the committee was passed Nov. 17-18 by the Rubber people at a meeting in Akron.

The committee consists of Edgar B. Davis, Harvey S. Firestone, Paul Litchfield, Charles B. Raymond, George B. Hodgman, C. T. Wilson, Harry T. Dunn and H. S. Voorhees, secretary of the rubber association, which consists of 330 members.

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Perfecting Hal-Abbott Merger

CLEVELAND, Nov. 27—As announced in the Oct. 25 issue of AUTOMOTIVE INDUSTRIES, the Abbott Corp. and the Hal Motor Car Co. were planning a merger, and a creditors' committee of the Abbott Corp. will report on the details at a meeting of the stockholders to be held Dec. 7. Of this committee, R. D. Mock, treasurer of the Hydraulic Pressed Steel Co., is chairman, and J. H. Baldwin, president of the Dunlap-Ward Advertising Co., and Louis N. Gay, president of the Consolidated Auto Top Co., are members.

The basis of the proposed merger is that holders of preferred stock of the Abbott Corp. will secure one share of the preferred of the new organization, and a half share of the common of the same, in exchange for one share of Abbott preferred. Holders of Abbott common are to go in share for share. It is expected that the new company will have about $1,800,000 stock.

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Goodyear Sales Total $111,549,552

AKRON, OHIO, Dec. 3—At the annual meeting of the stockholders of the Goodyear Tire & Rubber Co. it was announced that the total sales for the year ending Oct. 31 amount to $111,549,552. This is an increase of 74.37 per cent over those of the preceding year. About 10 per cent of the world's entire supply of crude rubber, totalling 23,000 tons, was used during the year. It will be noted that the drive to pass the $100,000,000 mark was exceeded by $11,549,522.

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Commonwealth Adds to Personnel

NEW YORK, Dec. 4—The Commonwealth Finance Corp., has made the following additions to its executive personnel: Frank H. Tomlinson, manager, retail collection department; Clarence H. Sanderson, manager, wholesale collection department; H. Conduit Johnson, office manager; P. F. Pellegrim, credit department.

Commandeered Tin Is Released

Navy Department to Empty Warehouses of Supplies—Centralized Control

WASHINGTON, D. C., Dec. 1—The Navy Department will release a great amount of commandeered tin now held in New York warehouses to private industries throughout the country. This agreement followed the protest of the Department of Commerce, which was to the effect that many private concerns were suffering a shortage of tin and were seriously handicapped by lack of metal. The American Steel and Iron Institute, designated as consignee of all imported tin by the War Industries Board, will endeavor to secure another supply of tin for the Navy's needs, and in the future an institute sub-committee will look after the Navy's special needs. This new plan is said to place all the tin supply of the entire country under centralized control, thereby assuring tin to the Government departments and to private firms on an equitable basis.

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Newman Again Takes Chalmers

CHICAGO, Dec. 3—The Chalmers again is under the dealership of Harry Newman, in company with the Maxwell, the Hal and the King. The territory involved is the same as that for the Maxwell, namely, Illinois, western Indiana, eastern Iowa and northern Missouri. All the cars will be carried by the agency, for the time being at least.

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Cylinder Oil Advances

CHICAGO, Dec. 4—The Standard Oil Co. of Indiana has advanced the wholesale price of cylinder oil 2 cents a gallon. Other engine oils have been advanced from 1 to 5 cents a gallon throughout the entire territory served by this company. Lubricating oils were advanced from 1 to 5 cents a gallon wholesale in New York last week.

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Capital Die Takes Over Machine Plant

COLUMBUS, OHIO, Dec. 4—The Capital Die, Tool & Machine Co., has taken over the plant formerly operated by J. B. Hoover. Mr. Hoover has been retained as chief designer. R. B. Ralston is vice-president and H. L. Gibney, formerly machine foreman of the Pennsylvania Railroad, is secretary and general manager.

The plant will continue the manufacture of dies, jigs, gages, tools and all classes of machine shop and production work. It will also manufacture Ever Ready metal heat treating gas furnaces.

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New Plant for Rothweiler

SEATTLE, Dec. 4—Rothweiler & Co., manufacturers of gasoline handling equipment has moved into its new plant.

Plans Great Truck Drive-Away

War Department Plans to Save Freight Tonnage and Free Roads for War Work

WASHINGTON, Dec. 3—The coming year, commencing with January, will witness a steady, unceasing, constant drive-away that will force all past drive-aways into insignificance—the driving overland by their own power of 30,000 trucks from factory to seaboard for shipment to Europe.

This vast drive-away plan now contemplated by General Chauncey B. Baker, Chief of Embarkation, Quartermaster Corps, in collaboration with the Military Truck Production Board and the Highway Transport Committee of the Council of National Defense, includes many possible advantages and aims particularly to:

(a) Save freight tonnage.
(b) Supplement railroads.
(c) Train military truck drivers.
(d) Mentally visualize the trucks to the public.
(e) Develop military highways.
(f) Test each and every truck.

A freight car has a capacity for carrying two of the new trucks. The drive-away therefore saves the use of 15,000 freight cars which means that 15,000 freight cars with capacity for 40 tons each, or 600,000 tons in all, will be free to haul other necessary war supplies.

The trucks with capacity for 3 tons each may themselves haul full loads of necessary repair parts and possibly other supplies manufactured in the same cities where the trucks are assembled—a total load of 90,000 tons—a saving of 2000 freight cars. Thus between the use of the motor power and the utilization of the truck hauling capacities, a total saving of 690,000 tons will be effected, which means the release of 17,250 freight cars for other purposes.

The lines of travel have not yet been completely worked out, and cannot be until the assembly maker's contracts are awarded, but the general plan now contemplated includes the use of many feeder traffic lines operating from North and South to the main arteries of travel which will probably include the Lincoln Highway and one or two parallel lines.

In all probability the contracts will be awarded to makers in Detroit, Kenosha, and Clintonville, Wis., Indianapolis, Toledo, Lima, Dayton, Cleveland, Buffalo and Pittsburgh, and shipment will be from Atlantic ports. Thus there will be feeder roads from:

Clintonville, Wis., to Chicago.
Detroit to Lima by way of Toledo.
Cincinnati to Lima and Bucyrus, Ohio.
Indianapolis to Dayton, Ohio.
Cleveland to Pittsburgh, Gettysburg, Pa., to Newport News.
Gettysburg to Washington.
With additional roads connecting the various links.

All of which will be used for the truck highways and which will include about 2000 miles of roads in all. According to information gathered by the Highway Transport Committee about 7 per cent more will have to be repaired, while all of the highways contemplated will demand constant and rigid maintenance to insure efficient operation. Bridges on these roads are to be surveyed and inspected by bridge engineers of the different states and will in many instances have to be re-built and repaired to stand the heavy strain of the thousands of loaded trucks.

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Goodyear Leads in Y. M. C. A. Work

AKRON, Dec. 3—In the recent drive for the Y. M. C. A. fund the teams from the Goodyear, Goodrich, Firestone and Miller Rubber plants were among the most successful. The following are the totals from these companies:

Firestone teams	$22,146.55
Goodrich teams	19,517.82
Goodyear teams	22,899.68
Miller team	9,044.15

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Reo Using Horse Cars for Freight Equipment

LANSING, MICH., Dec. 1—The Reo Motor Car Co. has made arrangements with the Arms Horse Car Co., Chicago, for the use of its freight car equipment. The freight cars so procured will be used for shipment of cars to Reo dealers, and the dealers will be charged at a fixed rate per day during the time that the car is going from the factory to the dealer and back.

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Two New Fuller Gearsets

KALAMAZOO, MICH., Dec. 3—Fuller & Sons Mfg. Co. is bringing out a new four-speed and reverse sliding gear gearset with direct drive on fourth. It is to be built in two styles, one a standard unit powerplant complete with dry-plate and multiple disk clutch and controls. This type is known as model GU. The other model, "G," is practically the same except that it is for amidship mounting and does not contain the clutch and control. The new unit is designed primarily for motor trucks of 2 to 3 tons capacity, but is also suitable for large passenger cars.

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No Vanderbilt or Grand Prize Races

NEW YORK, Dec. 3—The Motor Cups Holding Co., controlling both the Vanderbilt and Grand Prize race cups, has decided against using these cups in competition this year or in 1918. The plan of a western promoter to hold the race in San Antonio, Texas, has fallen through on account of the desire of William K. Vanderbilt to withdraw the cups from competition.

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T. D. Norris Dead

ROCKLAND, ME., Dec. 3—Henry Dole Norris, president of the Thompson & Norris Co., and one of its founders, died here on Oct. 20.

S. A. E. to Discuss War Truck

Development of Standardized Vehicle Will Be Feature of January Meeting

NEW YORK, Dec. 4—The engineering reasons back of the standardized U. S. war trucks will constitute an interesting part of the S. A. E. program to be held during the afternoon of Thursday, Jan. 10, at the midwinter meeting of the society. The development of the standardized truck represents one of the big steps in war standardization. It represents a step thought impossible by many truck manufacturers. It was not thought possible that forty or more engineers from almost as many different companies could be gotten together and develop a standard type truck.

Reasons for Various Developments

How this was done and the reasons back of the various parts of the design are to be told by the engineers who did the work. The engineering reasons back of the engine will be one subject. The engineering reasons back of the transmission will be another. The engineering details entering into the general chassis design will be a third. The engineering reasons in the axle design and other respects will be a fourth. The tests to which the trucks have been put and the results will also be told. The names of those engineers having this work in charge will be made known in another week. Several of them have for some weeks been preparing the information that they will give to the engineers at that meeting.

The sale of tickets for the Automotive Industries Dinner to be held at the Hotel Biltmore, Thursday evening, Jan. 10, is progressing rapidly. Checks have been received for 304 tickets. The sale of tickets for the War Dinner at the New Morrison Hotel, Chicago, on Friday, Feb. 1, is also progressing rapidly, 244 tickets having already been sold. The Mid-West Section, located in Chicago, is going to sell 300 tickets in the city.

Tractor Program Ready

The complete tractor program for the afternoon engineering session on Friday, Feb. 1, at the Hotel Sherman, Chicago, is nearly ready for announcement. It is one of the most complete programs dealing with tractor design that has so far been attempted. The fundamentals of tractor engine design, the fundamentals of tractor transmission systems, and the fundamentals of general tractor design will be discussed. Three of the best-known tractor engineers have practically agreed to handle these subjects. One of the best-known gasoline chemists in America has under consideration the presentation of a special paper on tractor fuels, embracing the all-important subject of what tractor engineers will have to keep in mind in designing to meet the fuel requirements of the future.

Appleton Plant for Racine

Company Has Bought Site and Will Begin Work on Machine and Assembling Shop

APPLETON, WIS., Dec. 3—The Racine Motor Truck Co., Racine, Wis., which was incorporated about six months ago to take over and develop the motor truck business conducted for many years by Piggins Bros., Racine, and capitalized at $500,000, has decided upon Appleton, Wis., as the location of its permanent factory and headquarters.

The company has purchased a site and will begin work soon on the erection of a machine and assembling shop, 60 by 300, one story high, which will be the first unit of a large group planned to be built in Appleton. Offices have been opened in the Lyons Building, 821 College Avenue.

More than one-half of the capital stock has been paid in, and it is stated that Appleton interests have taken shares and will be represented on the board of directors. The officers of the company are: President, Ira L. Miller; vice-president and general manager, Charles Piggins; secretary and treasurer, B. F. Henline.

The company has been manufacturing Reliance trucks in leased quarters in Racine since its organization. The corporate style probably will be changed to Reliance Motor Truck Co. In the new Appleton plant the line of products will be increased to include 1¼, 2½, 4 and 6-ton trucks, with internal gear drive. The company also intends to manufacture axles for the truck building trade. The new plant is expected to be ready about Feb. 15 or March 1.

Taxicab Merger in Boston

BOSTON, Dec. 1—The Town Taxi, Inc., is the name of a newly formed company here that has taken over the Rockett Taxicab Co. and the Franklin Cab Co., which have been doing business here for some years with stands at some of the big hotels. It has put into service a fleet of 20 Dodge Brothers cars. The company has started out with a new rate of fare which is lower than the prevailing rate of the other big company here. The first 1/3 mile is 25 cents; each 1/3 mile thereafter, 10 cents; each six minutes waiting, 10 cents; each additional passenger over one, 10 cents.

Silvex Is Reorganized

NEW YORK, Dec. 3—The Silvex Co., Bethlehem, Pa., has reorganized and reincorporated with additional capital to provide for increased business. It is making many plugs for use in aviation motors. The new stock consists of $1,000,000 common and $1,000,000 preferred. The board of directors consists of E. H. Schwab, president; J. H. Ward, E. B. Turn, W. M. Davidson and W. H. Lumpkin, all of Bethlehem. The company will shortly move into a new concrete and steel factory.

Represents Willys-Overland in Capital

WASHINGTON, Nov. 28—E. C. Morse, formerly vice-president of the Chalmers Motor Co., has joined the forces of the Willys-Overland Co. and the subsidiary corporations as special representative in Washington. Mr. Morse has opened offices in the Munsey Building.

To Study Conditions in Latin America

Class Journal Expert Will Report on Sales Possibilities—Will Sail Immediately

NEW YORK CITY, Dec. 3—*El Automovil Americano*, the Spanish export publication of the Class Journal Co., which publishes AUTOMOTIVE INDUSTRIES, *Motor World*, and *Motor Age*, is sending Rodolfo Ried to visit practically all Latin-American countries for the purpose of reporting directly on automobile conditions in these countries. The reports will refer particularly to existing market conditions in these countries and the demand for automobiles, motor trucks, farm tractors and motorcycles.

Mr. Ried leaves the end of this month and his itinerary will include such cities as Habana and San Juan in the West Indies, and the following in South America: Barranquilla, LaGuaira, Pernambuco, Bahia, Rio de Janeiro, Santos, Sao Paulo, Rio Grande do Sul, Puerto Alegre, Montevideo, Asuncion, Buenos Aires, Bahia Blanca, Rosario, Tucuman, Punta Arenas, Valdivia, Concepcion, Santiago, Valparaiso, Antofagasta, Oruro, La Paz, Cuzco, Callao, Lima, Guayaquil, Buenaventura, Panama, Bogota and Caracas. In addition the capitals and principal cities of Central American countries and Mexico will be included.

Walsh Federal Trade Counsel

WASHINGTON, Dec. 3—John Walsh, who for 3 months has been acting chief counsel of the Federal Trade Commission, has been chosen chief counsel.

Automotive Securities Quotations on the New York Exchange

	Bid	Asked	Net Ch'ge
*Ajax Rubber Co.	47	51	+1½
*J. I. Case T. M. Co. pfd.	..	78	..
Chalmers Motor Co. com.	2	4	..
Chalmers Motor Co. pfd.	..	50	..
*Chandler Motor Co.	65½	66	+1
Chevrolet Motor Co.	64	67	+1
*Fisher Body Corp. com.	20	34	..
*Fisher Body Corp. pfd.	75	80	..
Fisk Rubber Co. com.	..	45	..
Fisk Rubber Co. 1st pfd.	98	103	..
Fisk Rubber Co. 2nd pfd.	70	80	..
Firestone Tire & Rubber Co. com.	96	100	..
Firestone Tire & Rubber Co. pfd.	97	100	..
*General Motors Co. com.	88¼	90	—4½
*General Motors Co. pfd.	74	76	+1½
*B. F. Goodrich Co. com.	35½	37	+ ¼
*B. F. Goodrich Co. pfd.	93⅛	97	+4
Goodyear Tire & Rubber Co. com.	144	147	+3
Goodyear Tire & Rubber Co. pfd.	95	98	+2
Grant Motor Car Corp.	2	3	..
Hupp Motor Car Corp. com.	2	3	..
Hupp Motor Car Corp. pfd.	74	79	..
International Motor Co. com.	7	15	..
International Motor Co. 1st pfd.	30	50	..
International Motor Co. 2nd pfd.	20	25	+5
*Kelly-Springfield Tire Co. com.	40	41	+2
*Kelly-Springfield Tire Co. 1st pfd.	75	82	+1
*Lee Rubber & Tire Corp.	13	14	+2
*Maxwell Motor Co., Inc., com.	25¼	28	+3
*Maxwell Motor Co., Inc., 1st pfd.	54	56	..
*Maxwell Motor Co., Inc. 2nd pfd.	18½	19	+2½
Miller Rubber Co. com.	114	120	+5
Miller Rubber Co. pfd.	..	99	..
Packard Motor Car Co. com.	110	118	..
Packard Motor Car Co. pfd.	92	96	..
Paige-Detroit Motor Car Co.	14	16	+1
Peerless Truck & Motor Corp.	12	14	+1
Portage Rubber Co. com.	106	110	+3
Regal Motor Car Co. pfd.	10	20	..
Reo Motor Car Co.	17	19	+2
*Saxon Motor Car Corp.	5½	6	+ ½
Springfield Body Corp. com.	..	..	..
Springfield Body Corp. pfd.	..	..	..
Standard Motor Construction Co.	9½	10½	..
Standard Parts Co.	..	75	+5
*Stewart-Warner Speed. Corp.	47	48	1½
*Studebaker Corp. com.	45½	46½	..
*Studebaker Corp. pfd.	..	95	+5
Swinehart Tire & Rubber Co.	20	23	+3
United Motors Corp.	16	16½	+ ¼
*U. S. Rubber Co. com.	52½	53½	..
*U. S. Rubber Co. pfd.	95½	97	+ ½
*White Motor Co.	36½	38	..
*Willys-Overland Co. com.	19	20	+1
*Willys-Overland Co. pfd.	70	71	..

*At close Dec. 1, 1917. Listed N. Y. Stock Exchange.

OFFICIAL QUOTATION OF THE DETROIT STOCK EXCHANGE

ACTIVE STOCKS

	Bid	Asked	Net Ch'ge
Auto Body Co.	..	9	..
Bower Roller Bearing Co.	19½	25	..
Chevrolet Motor Co.	65	67	+3
Commerce Motor Car Co.	..	..	..
Continental Motor Co. com.	5¼	5⅝	— ⅛
Continental Motor Co. pfd.	..	..	..
Edmunds & Jones com.	20	28	..
Edmunds & Jones pfd.	..	..	..
Ford Motor Co. of Canada	154	162	+8
Hall Lamp Co.	..	..	..
Michigan Stamping Co. com.	..	12⅝	..
Motor Products	..	..	..
Packard Motor Car Co. com.	108	115	..
Packard Motor Car Co. pfd.	..	94	..
Paige-Detroit Motor Car Co.	13¼	14¼	— ⅛
Prudden Wheel Co.	..	12	..
Reo Motor Car Co.	18⅝	18⅞	+1⅞

INACTIVE STOCKS

Atlas Drop Forge	..	32	..
Kelsey Wheel Co.	80	88	..
Regal Motor Car Co.	..	26½	..

Electrical Equipment for Tractors

Tractor Engineers Discuss Possible Future of Such at Minneapolis

P. M. Heldt

Engineering Editor Automotive Industries

MINNEAPOLIS, Dec. 5—*Special Telegram*—Representatives of electrical equipment apparatus for farm tractors were much in evidence at to-day's meeting of the tractor division of the S. A. E. Standards Committee held here at Radison Hotel. The meeting was followed by a dinner at which over 100 were present and this was in turn folowed by a professional session of the Minneapolis section this evening.

A. F. Williams of the K-W Ignition Co., spoke on tractor ignition and others representing electrical equipment on starting and lighting as well as ignition equipment for tractors. J. A. Gelzer of the Wagner Electric Co. handled the latter subjects. Uncertainty as to the future of the tractor and the exact form it will follow was shown by the animated discussion following these papers. Many believe that owing to the war necessity of women and perhaps maimed soldiers having to operate farm tractors that it is necessary or may be necessary to fit starting equipment for tractor engines and that adequate lighting equipment will be an essential.

A standard form of specifications of farm tractors to be used in catalogs was adopted. This embraces the various mechanical specifications which are most useful and has in mind making catalogs more valuable and simplifying them to the greatest extent.

Samples were shown of several designs of couplers for tractor drawbars, this being one of the standardization problems that the division is working with. It was decided to get the opinions of tractor makers on these different designs before taking any action upon them.

Dent Parrett, the new chairman of the Tractor Standards Division and President of the Parrett Tractor Co., Chicago, presided at the all-day standards session as well as at the evening meeting. There were several representatives from western universities present all of whom contributed to the discussions.

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Government Work for Atwater Kent

PHILADELPHIA, Dec. 6—The Atwater Kent Mfg. Works has contracts for a limited amount of government work. This is not connected with the company's new plant, which has been built for normal expansion purposes.

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Saxon Adds Delivery Model

DETROIT, Dec. 5—The Saxon Motor Car Corp. is delivering to dealers a 500-lb. light delivery car built on its six-cylinder chassis. Either panel body or open body with curtains is supplied. The chassis has been made slightly heavier and strengthened where necessary to make it suitable for the additional load. The price is $850.

—

Firestone Revises Wheel Selling Plan

AKRON, Dec. 5—The Firestone Tire & Rubber Co. has slightly altered its selling plan on demountable rims and wheels for Ford cars. Hereafter orders for such equipment are to be filled direct by jobbers. Heretofore such orders have been filled by Firestone branches.

—

Favor Federal Aid for Roads

WASHINGTON, D. C., Dec. 5—The annual report of the Secretary of Agriculture states that all of the states have assented to the provisions of the "Federal Aid for Roads Act." Continuing, the report says that probably the most significant result thus far of this has been the enactment of effective road laws in numerous states. It is estimated that the expenditure of state funds for roads in 1917 will be an increase of 50 per cent over 1916.

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No Right of Way for Coal

WASHINGTON, D. C., Dec. 5—Judge Robert S. Lovett, Government director of priorities, declared to-day that he would not issue an order granting uninterrupted right of way to coal cars on railroads as requested by Fuel Administrator Garfield.

Expect Increase of Steam Cars

A.S.M.E. Men Hear Papers Setting Forth Advantages of Steam Power

NEW YORK, Dec. 5—To the American Society of Mechanical Enginers now holding their annual convention two papers of interest to automobile engineers were presented to-day. The advantages of steam as an automotive power were outlined by E. T. Adams whose paper very closely resembled that given to the S. A. E. by Abner Doble early in the present year.

The author's strongest point was the facility with which steam power can be applied to commercial vehicles and tractors by making use of types of boiler and engine which are associated with passenger cars rather than with stationary steam plants. His argument was that such steam units had no trouble in employing kerosene or even slightly heavier fuel.

A second paper of perhaps greater interest to engineers, since its practical application is much more general, was on balancing, by N. W. Akimoff. Akimoff gave an analysis of causes of unbalance and pointed out the reasons for obtaining static balance before balancing dynamically. He has devised a very simple machine for obtaining both sorts of balance.

More Than a Billion for Aviation

(*Continued from page 1018*)

Aeronautical salaries of instructors in flying, instructors in ballooning, aeronautical mechanical engineers, insnectors of airplanes and airplane engines, factory inspectors, consulting engineers, accountants, clerks, bookkeepers, draftsmen, plant engineers, photographers, military storekeepers, and wages of packers, chauffeurs, aviation mechanicians, model and instrument makers.	$9,012,600
Wages	544,200
Lighter-than-air equipment	8,171,000
Spare parts and accessories	47,173,200
Airplanes and hydroplanes	235,866,000
Extra engines and spare parts.	553,289,120
Maintenance, upkeep, and operation of air squadrons	20,950,000
Aero stations in United States.	20,400,000
Aero stations in Panama	9,420,000
Aero stations in Hawaii	4,420,000
Maintenance of buildings in Europe	9,127,000
Purchase of land	16,700,000
Warehouse and supply depots.	5,595,000
Aviation clothing equipment	1,358,440
Expenses of officers, enlisted men, and civilians on special duty	67,200
Vocational training	120,000
Mileage to officers and traveling expenses of civilian employes.	3,050,000
Schools of military aeronautics.	8,050,000
Machine guns for airplanes	77,475,000
Development of new types of airplanes and engines	2,000,000
Contingent expenses	3,405,500
Construction	100,000
Total aviation	$1,032,294,260

Some of the money which the signal service asks for purposes other than aviation, includes $46,163,733.39 for mobile army equipment, $1,369,089.60 for radio equipment, $21,708,8[illegible]7.50 for motor vehicles, and $35,191,914.28 to restock and maintain an adequate signal supply depot with the American expeditionary forces in France.

The item of $9,012,600 for aeronautical salaries of men identified with the work of the aviation section calls for 376 instructors of flying—four at $5,400, four at $5,200, thirty-two at $4,800, twenty-four at $4,200, ninety-two at $3,600, twenty-four at $1,509, and 196 at $1,200.

Part of this sum will be spent on the employment of thousands of inspectors of airplanes under construction. The estimates call for ten inspectors of airplanes and airplane engines at $3,000 each, forty at $2,400, 100 at $2,000, 1500 at $1,800, 800 at $1,600, 950 at $1,400 and 600 at $1,200 each, a total of 4000 inspectors. There are also estimates for seventy-five factory inspectors at $2,000 each, sixty at $1,800, and 140 at $1,400.

In addition to this request for funds for naval aviation, Congress is asked to make an appropriation of $260,000 for the work of the National Advisory Committee for Aeronautica. This is to be used for scientific research, technical investigations, and special reports in the field of aeronautics, including the equipment, maintenance, and operation of a research laboratory.

Air Route Marked Out

Dayton to Rantoul Defined by Numbers on Roofs and Flashing Lights

INDIANAPOLIS, IND., Dec. 3—As an aid to the training of aviators for the United States service, an air route from Dayton, Ohio, to Rantoul, Illinois, has now been well defined, under the direction of Carl G. Fisher of Indianapolis, Ind., chairman of the mapping committee, appointed by the National Advisory Committee on Aeronautics.

The initial program for a marked route consisted of serial numbers painted in large white figures on barn roofs, with an arrow pointing the direction where a clear field of the proper area for safe landing might be found, in event an emergency landing was necessary.

With the Indianapolis Motor Speedway as a central point landing field, large numbers from 1 to 72 were painted on barn roofs between the Speedway and Dayton, at an average distance of about two miles apart. From the Speedway to Rantoul the field numbers range from 1 to 28. The distance between the fields on this end of the route averaged about four miles from one to the other.

Following the landing field or daylight route marking scheme, the second phase of the work was to afford assistance in furthering the difficult training in night flying. A patriotic spirit and the desire to assist the Government prompted the citizens, town authorities and civic organizations of the various municipalities selected for signal stations to purchase, erect and provide for the maintenance of signal lighting equipment at Fairfield and Wright flying fields near Dayton, at Dayton and Eaton, Ohio; Richmond, Cambridge City, Knightstown, Greenfield, Cumberland, Ft. Harrison, Indianapolis, Indianapolis Motor Speedway Landing Field, Brownsburg, Jamestown, Crawfordsville, Waynetown, Veedersburg and Covington, Indiana; Danville and Champaign, Illinois, the latter city being only ten miles south of the Government training field at Rantoul, Illinois.

Signal equipment consists of four or six light projectors with red or green lenses, equipped with lamps of 200 watt capacity. For indicating the direct flying route from the Dayton flying fields to the Rantoul field, lights flash on and off at about six second intervals. To assist the pilot to check his location, the station at the end of the first fifty miles west of Dayton flashes green and red alternately. The completion of the second fifty-mile leg is indicated by the rapid flashing signal for the Indianapolis motor speedway landing field. Continuing west, the third checking signal consists of six green lights flashing on and off, indicating Crawfordsville, Indiana. Again at Danville, Illinois, the light flashes red and white at six second intervals. All other units which indicate to the pilot or his observer that they are following the direct course employ red lights flashing on and off at the regular stated intervals.

Drifting with the air currents and unconsciously leaving the direct flying course will be corrected by a system of side marking lights.

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Russian Shipping Report Denied

WASHINGTON, Nov. 30—Official denial has been made by the War Trade Board of a report recently given prominent notice in newspapers to the effect that no shipments of supplies will be permitted to go from the United States to Russia. In this connection it is mentioned that cargoes are now moving to Russia.

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Saxon Four Advanced $50

DETROIT, Dec. 3—The price of the four cylinder Saxon roadster will increase from $395 to $445 on Jan. 1. This is an increase of $50.

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Hayes Business Way Ahead

ST. JOHNS, MICH., Dec. 3—The Hayes Motor Truck Wheel Co. has to-day enough business on its books to keep it busy for six months, and has for the past year been operating overtime. In the past 10 months 37,006 sets of truck wheels have been produced, and at present about 250 men and 20 women are employed. A new bending department is now in course of construction, and though plans for further expansion are being made, the actual expansion will not take place until the present unsettled conditions are over.

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Burford to Continue

FREMONT, OHIO, Dec. 3—The rumor that the Trailer Motor Truck Co. would not continue manufacture of the Burford motor truck was unfounded. This factory is now manufacturing all the trucks it can produce and will continue their manufacture. Recently a two-ton Burford was sent over a test trial in Texas for the Government and made the service tests without break or stoppage.

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Offer Bogus War Contracts

DETROIT, Dec. 3—The Board of Commerce has issued a warning to all manufacturers, on the authority of the Government, stating that certain men representing themselves to be manufacturer's agents are offering war contracts throughout the country on a commission basis. These men claim that they are able to secure contracts through political pull, and in many cases state that they can sell goods already manufactured to the Government. It is also stated that agents of this kind are already at work in this city. Most of the Government's awards are placed on a competitive basis, hence so-called agents cannot help in any way, and the Government prefers to deal directly with the manufacturers, and not with a third party.

Peugeot Production Manager Here

Will Study Tractors, Forging and Quantity Manufacture—French Factory Enlarged

NEW YORK CITY, Dec. 4—Adrien Clerc, production manager for the famous French automobile firm of Peugeot, is in America to make a study of tractors and production methods. He will visit the principal tractor plants in the Middle West and is also making a close examination of American methods in drop forging. The Peugeot Co. now employs 26,000 hands in its several plants, and has expanded enormously in the last three years. At present some automobiles are being made for the French army, some trucks, airplane engines and munitions.

Clerc says that the French automobile industry as measured by its factories is now many times the size it was before the war. Development in truck building has been especially noteworthy. Before the war France had few truck makers and the French trucks were not very good taken as a whole. Now things are quite different. One of the leading French truck makers to-day is Berliet, who before the war was best known for its large sporting type passenger cars.

Expects Big After-War Demand

There is a probability that there will be considerable call for tractors after the war, and the French manufacturers are preparing to meet the demand. France is a particularly difficult country for tractor selling because the land is split up into innumerable minute farms, often of peculiar shape. Each small land owner is poor and frequently he and his family do all the tilling of their own soil.

In the war area where all landmarks have have been swept away it will be impossible ever to re-establish the small holdings in the same shape they were before. Nobody could ever lay out the ground again now that every wood and every building has been swept away. Here, therefore, farming must be started on a large scale by some government or community system and the land will be laid out on more economical lines, giving the tractor a chance to work efficiently. Such a reorganization might easily be followed by community farming in other parts of France; in fact it is considered that French agricultural methods must be improved to meet the needs of the after-war conditions.

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Rubber Shipments Boosted

AKRON, Dec. 5—The war has increased the rate on crude rubber shipments from the ports of Singapore and Penang to the Pacific coast from $24 to $95 a ton. The Straits Settlements furnish about 70 per cent of the rubber supply, and of this the Akron factories use about one-half.

Industrial Review of the Week

A Summary of Major Developments in Other Fields

A New Service

¶Herewith AUTOMOTIVE INDUSTRIES *supplies for the benefit of its readers a general summary of important developments in other fields of business. This is rendered possible by the editorial co-operation of leading industrial publications which are recognized authorities.*

By compressing the general industrial situation into this form we hope to give our readers a clear and comprehensive idea of up-to-the-minute developments which they could otherwise secure only with considerable expenditure of time and effort.

Coal Shipments Increase

Shipments of anthracite to various consuming centers have increased somewhat during the past week. However, the cold weather so stimulated orders for this fuel that a serious shortage is feared at various eastern points. Dealers were in many instances unable to relieve the demand which resulted from the cold wave. It is hoped in many quarters that a priority order will be issued in favor of New England with the close of Lake navigation. The volume of coal which has been steadily flowing to the Lake ports during the past few months, if turned to New England, either all-rail or for transshipment by water, would doubtless do much to relieve the situation in that territory.

Adequacy or inadequacy of the country's fuel production now hinges upon transportation. Labor as a whole is at least temporarily quiescent. Much complaint is heard, however, of conditions, particularly in the Middle West, which do not permit the miners to work full time, and the wages actually earned are thus small. While it was earnestly hoped that the cessation of shipments to the Lakes would result in easier conditions of transportation, it now appears that the rolling stock employed in this traffic is sent further afield, with the result that cars are slower in being returned to the mines.

Lake shipments from the Pittsburgh region have now practically ceased, yet the car supply in this producing district is if anything poorer than before. This condition is more obvious perhaps in the coke industry than in coal production. The production of coke appears to be on the decline, not because fewer ovens are capable of operation, but because fewer cars are furnished and there is little incentive for coke stocking. The mild weather preceding the cold wave of the current week did much to relieve the critical situation in the Mississippi Valley, particularly west of that river. It is even said that certain consumers in Kansas City have been able to accumulate small stocks.

The cold weather, however, brought a deluge of small orders from householders and other consumers; although many of these could be filled, a number could not be taken care of. Little is now heard of any unwillingness on the part of coal operators to sell at Government prices. In most cases operators would be glad to sell their coal, or that which is not taken up by contract, at the regulation price set by the Fuel Administration. This is, however, in most cases impossible because of the lack of transportation facilities. There is no scarcity of mines or of working places to produce the coal necessary, and while the scarcity of men is more or less pronounced and is often complained of by the operators the chief drawback, and the one which limits production at the present time, is the scarcity of cars. There appears to be no immediate prospect of relief from this condition. The real problem is thus rather one of distribution than of production. The substitution of one grade of coal for some other, which has been habitually burned in the past, may accomplish much toward relieving the present stringency; thus in Kansas City more run-of-mine coal is on hand in the dealers' yards and bins than current orders call for. There is, however, in this locality a pronounced shortage of lump. It is urged that consumers substitute run-of-mine coal for the lump which they have habitually burned heretofore.—*Coal Age.*

Pig Iron Production Slightly Increased

Pig iron statistics for November show an unexpected though very slight increase in the daily rate. For the 30 days the total was 3,205,794 tons, or 106,859 tons a day, against 3,303,038 tons in October, or 106,550 tons a day. So much had been made of the banking down of furnaces at Youngstown last month, due to coke shortage, that a serious falling off was looked for. But other districts made up the loss which turned out to be only about 10 per cent from the Youngstown output of October.

So many furnaces have been working badly, due to frequent bankings and in part to poor coke, that more are compelled to go out for relining. The net loss was 10 in November, and the 345 furnaces active Dec. 1 had a capacity of 106,933 tons a day, against 109,059 tons a day for 355 furnaces on Nov. 1. November just wiped out the October gain of 10 in active stacks.

Railroad difficulties continue the most serious handicap of blast furnaces and steel works. The Youngstown situation is better, but Pittsburgh is now affected more than in November by lack of coke, and there and in Ohio the Steel Corporation to-day has 20 furnaces banked. Steel output has been kept up heretofore by drawing on pig iron stocks but now the reserve of pig iron has been used up.

The first effect of the pooling arrangement of Eastern railroads has been the cancellation of many permits both for export and domestic shipments of pig iron and steel, some plants meanwhile having practically no outlet. The special effort to facilitate the movement of ore, coal and coke will work for betterment in the raw material supply, but the problem of freight congestion, particularly at Pittsburgh, promises to dominate the steel industry for months.

New calls for cost sheets have come to steel producers in the past week from the Federal Trade Commission, and fresh agitation of Government control and of price reductions come from the same quarter, as the Pomerene bill is brought up for Congressional action. Added to all the troubles encountered in production and distribution, the possibility of fresh unsettlement just as the new price schedule was becoming effective makes the outlook by no means encouraging.

Exports of iron and steel have been much reduced in the working out of the Government embargoes, and while foreign business is constantly offered the mills at prices well above the Government schedule, few permits are granted.

Government buying continues large, but chiefly in pursuance of programs already outlined. The past week has seen considerable orders for plates and for forging steel for shells, but thus far little is heard of new contracts for shell steel for the Allies.

Additional rails have been bought for shipment to France—about 15,000 tons. In a recent purchase of rails for a great storage operation in New Jersey the Government paid $55, but as high as $73 was paid by a domestic road on 2500 tons for delivery in the early months of 1918. The urgent need of rails for increased siding and terminal facilities is bringing rail prices more nearly in line with those for shell rounds, which are largely a rail mill product.

In the plate trade it is a growing belief that the Government will take all sheared plates ¼ in. and heavier after April 1. Recently Government orders for 50,000 to 60,000 tons of universal plates were placed with Youngstown mills and for some time plate shipments to the Government by one Pittsburgh company have been at the rate of 60,000 tons a month.

Most sheet mills have now covered their large trade for first quarter or first half of next year, and the Government is a liberal buyer both for export and domestic needs. Tin plate contracts for the first half have been generally closed and in some cases a full year's supply has been covered, the price for the second half to be adjusted later.—*Iron Age.*

Cummings Is Timken Advertising Manager

CANTON, OHIO, Dec. 2—Arthur H. Cummings is advertising manager of the Timken Roller Bearing Co., having resigned as assistant advertising manager of the B. F. Goodrich Co., Akron. No successor has as yet been appointed.

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Cliff Noble, formerly with the advertising department of the Hyatt Roller Bearing Co., is now connected with the advertising department of the Liberty Motor Car Co.

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Frederick H. Rengers, St. Louis, for four years a member of the Moon Motor Car Co. staff, has been made salesmanager.

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P. J. Foster, two years assistant manager for the Northern Rock Island Plow Co., Minneapolis, has been made district manager for the Federal Motor Truck Co., Detroit, and will have charge of Illinois, Wisconsin, Minnesota, North Dakota and Montana sales. Mr. Foster began five years ago with the Northern Rock Island Plow Co. as floor salesman.

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Louis Logie, manager of the Maxwell Motor Co., Ltd., Canada, is also manager of the Canadian Chalmers Co., Harry S. Lee, former Chalmers manager, having resigned.

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Melvin F. Doty has been appointed production manager of the Michigan Steel Casting Co., Detroit. He formerly was with Isaac G. Johnson & Co., Spuyten Duyvil, N. Y.

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W. M. Blackburn, formerly of the Warner & Swasey Co. and more recently purchasing agent of the F. B. Stearns Co., will be Supervisor of Estimates for the Standard Parts Co., Cleveland, Ohio.

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W. H. Queripel has become associated with the Kelly-Springfield Tire Co. and will cover New York City. Formerly he represented the Firestone Tire & Rubber Co.

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J. C. Matlack, former secretary and general manager of the Ajax Rubber Co., has been made president of the Globe Rubber Tire Mfg. Co., Trenton, N. J. His office will be in New York. Between his two rubber connections, Matlack was associated with the American Writing Paper Co., which position he still holds.

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C. B. Lindeman, formerly a Firestone Tire & Rubber Co. advertising man, has secured the Croix de Guerre.

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R. S. Whiteside, branch manager of the Hess-Bright Co., Philadelphia, and his assistant, G. L. Jenks, have enlisted in the aviation section of the U. S. Army. On account of this the retail branch of the company in Philadelphia has been closed. The business formerly carried on there will be handled direct from the factory.

Men of the Industry

Changes in Personnel and Position

Robert L. Ware has been elected vice-president and treasurer of the Smith Signal Corp., New York. He will supervise the sales and advertising of the Smith signal and the other devices which this company plans to market. They will be exhibited at the New York show.

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R. Gardner Kellogg, vice-president of the Mechanical Appliance Co., Milwaukee, has enlisted as a private in the United States Army.

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MC DONALD LEAVES HERRING TO GO WITH GIBSON

INDIANAPOLIS, Dec. 1—O. R. McDonald, formerly accessory sales manager with the Herring Motor Co., Des Moines, has accepted a similar position with The Gibson Co., a jobbing house in this city. McDonald has been active in the work of the National Association of Automobile Accessory Jobbers, is a leading member of that association's committee on assisting the trade and has been actively connected with trade organization and betterment work in Iowa. The Gibson Co. has just taken possession of a new building.

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Charles D. Lehmkuhl is secretary and treasurer of the Air-O-Flex Automobile Corp., Detroit, succeeding G. L. Nadel.

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A. L. Horn is city branch manager and E. W. Prewett is retail sales manager of the Willard Storage Battery branch in Detroit.

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Lette Shay is vice-president and chairman of the executive committee of the Higrade Motors Co., Harbor Springs, Mich. George Stone is assistant treasurer and L. W. Coppock is assistant secretary.

—

Ralph L. Corey, formerly assistant to the general manager of S. F. Bowser & Co., Fort Wayne, Ind., has received a commission as lieutenant in the division of aeronautical engineers, signal corps.

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R. B. Crane, former sales manager of the Double Fabric Tire Co., has been appointed manager of the sundry division of the Racine Rubber Co., Racine, Wis.

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David M. Goodrich, member of the directorate of the B. F. Goodrich Co. and son of Dr. B. F. Goodrich, was awarded a commission as major in the Infantry at Plattsburg, N. Y. This is the highest recognition army boards can give to a man entering the army from civilian life. It is expected that he will be in France next spring.

Harper Resigns as Overland Sales Manager

TOLEDO, Dec. 2—H. B. Harper has resigned as general sales manager of the Willys-Overland and has purchased the Philadelphia branch of the company, which in the future will be styled the H. B. Harper, Inc. The contract made by Mr. Harper for the next year is said to call for $5,000,000 worth of cars—or at the rate of $1 per capita in his territory. In the past, Harper has been associated with the Bowser Oil Tank Co., Ft. Wayne, Ind., the Ford Motor Co., and later with the Gibson Co., Overland distributers, Indianapolis, before joining the Willys-Overland Co., Toledo.

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John M. Kearney, connected with the Willys-Overland Co., New York, has resigned, to become special representative of the Graham Brothers Sales Co., New York.

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C. O. Langlois has resigned from the advertising department of the Liberty Motor Car Co., Detroit. He is succeeded by C. Lovell.

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A. R. Johnson is assistant advertising manager of the Hyatt Roller Bearing Co. He was formerly assistant advertising manager of the Cadillac Motor Car Co.

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W. J. Lannen is retail sales manager of the factory branch of the Studebaker Corp., Toledo. He was formerly assistant sales manager of the Detroit factory branch.

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M. B. Covert is sales manager of the Leonard B. Orloff Co., Oldsmobile distributer. He was formerly with the Cole Motor Car Co.

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J. R. Signmore is manager of the Studebaker Corp. interests in Vancouver, B. C.

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L. A. Sommer has been appointed vice-president and assistant general manager of the Allen Motor Co., Fostoria, Ohio, in charge of engineering and production.

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F. J. Broad is sales manager of the Motors Metal Mfg. Co., Milford Avenue and Pere Marquette railroad. He was formerly assistant purchasing agent of the Federal Motor Truck Co.

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E. Harvey Mendel, formerly sales manager of the Rex Ignition Co., New York, has joined the sales forces of the Champion Ignition Co., Flint, Mich.

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Charles H. Minto has been appointed Western District Manager of the Carlisle Cord Tire Co. with headquarters in San Francisco.

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Guy Vaughan has resigned as sales manager of the F. B. Stearns Co., Cleveland, to become identified with the Wright-Martin Aeroplane Corp., New Brunswick, N. J.

Three New Companies Start in Cleveland

CLEVELAND, Dec. 3—The Vlchek Tool Co. is incorporated for $900,000, by E. A. Meckes. The Northern Ohio Motor Transportation Co. has incorporated for $10,000. Harvey O. Yoder, and Monta M. Rick are incorporators. The Campbell Motor Trucking Co. is likewise incorporated for $25,000 by Geo. A. Schaufele, and Chas. B. Robinson.

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CLEVELAND, OHIO, Dec. 3—The Safe Motor Sales Co. has increased its capitalization from $25,000 to $100,000.

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AKRON, OHIO, Dec. 3—The Auto Electric Service Co. is incorporated for $10,000 by E. O. McKelvey and C. F. Schnee.

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DAYTON, OHIO, Dec. 3—The Dayton International Rubber Sales Co. is incorporated for $10,000. A. L. Smith and C. G. Vincent are incorporators.

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DETROIT, Dec. 3—The Packard Motor Car Co. has leased property at 46-52 Earl Street, Newark, N. J., for an addition to its service station. This building is 125 ft. by 125 ft.

Current News of Factories

Notes of New Plants—Old Ones Enlarged

Cruiser Starts Building

MADISON, WIS., Dec. 3—Work was undertaken to-day by the Cruiser Motor Car Co. on the erection of its new manufacturing plant, the first unit of which will be 73 by 260 ft. in size, one and two stories high. Construction will be hastened so that occupancy may be taken shortly after Jan. 1. The product will be a convertible touring-camping car, adapted for army field service.

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Downing Starts in Des Moines

DES MOINES, Dec. 3—The Downing Electrical Co. has entered the supply trade and will do an exclusive jobbing business. H. F. Sheppard who has been general manager of the Hippee-States Co. has severed his connection with that company and will have charge of the supply department.

Three-Wheel Vehicles Coming From Albany

ALBANY, N. Y., Dec. 3—The New York Rotary Motor Co. has been formed to make three-wheel parcel delivery vehicles. The capital is $1,700,000. The directors are S. S. Myers, Howard Myers and A. M. Sullivan of 60 Wall Street, New York.

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WASHINGTON, D. C., Dec. 3—A new motor car corporation has been formed here known as the Steam Car Sales Corp. with E. G. Helgesen president. The company will handle the Steamotor truck for Washington territory.

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Detroit Dealers More Cheerful

DETROIT, Dec. 1—Dealers are in a much more cheerful frame of mind at present than they have been for some time past, and this to a certain extent is a reflection from the increasing confidence of the manufacturer. But more directly is it due to the fact that the retail business is picking up slightly. The used car business is, however, still quiet, and several dealers are holding used car sales in the effort to keep them moving.

Automobile Trade With Argentina

(*Continued from page* 999)

part of the cultivated country from the Atlantic to the Andes.

"It is not surprising that with such an introduction during 1914 and 1915, 80 to 90 per cent of the American automobiles sold in Argentina to-day go to the wealthy farmers. These cars are receiving severe service. For months at a time they are left in the open. They are rarely washed from the date of purchase until they are finally discarded. They are not given that delicate attention that the city car receives. Expert repairmen are scarce through the Argentine camp, and only crude repairs on the gasoline engine are made. Notwithstanding these handicaps, the sales are increasing rapidly in spite of poor crop conditions and poor shipping facilities to Europe. There are to-day between 30,000 and 40,000 cars in Argentina.

Country Settlements Need the Automobile

"The Argentine camp, or country settlement, needs the automobile. It is a region of great distances, and many of the farms being very large, speedier transportation than the horse is required. While the large-farm system of ownership makes it easier to sell automobiles at the start, it eventually will work a hardship in that the selling market is limited as compared with a similar area of cultivated land in North America.

"The field of the motor truck in Argentina has not been developed to any extent, and the truck movement is lagging far behind the car movement. There is a good selling field for trucks in the city of Buenos Aires and a limited selling field in some of the other cities such as Rosario, Bahia Blanca, Mendoza and Cordoba. In the smaller cities street pavements are generally good, but wide streets are not so common as in Buenos Aires. There is a very big selling field with the estancieros.

"No country is better adapted to the use of the motor farm tractor than Argentina with its long level stretches, its entire freedom from stones, and its sparse farm population. The farm tractor was introduced by American manufacturers on the pampas several years ago, but unfortunately its application was not the greatest success. Seven or eight years ago mechanical farm help competent to care for the farm tractor was not to be had and the machines proved a failure, not owing to faulty design, manufacture or materials, but owing to lack of competent operators. Those tractors were largely of the heavy type, capable of pulling 8 to 12 plows. They are still to be seen, but are not in use because of the high cost of fuel and the problem of operators. Unfortunately they are not a good advertisement for the American tractor industry of to-day.

Tractors Not Popular To-day

"To-day the estanciero is not favorably disposed to the farm tractor, partly because of past experiences, but largely owing to the high price of gasoline, the cheapness of horses, and the poor crops of the last two years. The small American gasoline tractor capable of pulling three or four plows is on the Argentine market, but is not selling. In spite of the handicaps the estanciero is looking more favorably on the small tractor. He sees in it a cultivating capacity that will make up to some extent for the shortage of labor due to the cutting off of immigration since the war and the emigration of many Italian farm laborers who have left to join the colors of their native land."

Mr. Beecroft's report was prepared as an appendix to the report of the party sent to Argentina by the Latin-American Return Visit Committee and is published as "Argentine Market for Motor Vehicles," Miscellaneous Series No. 62, by the Bureau of Foreign and Domestic Commerce because it deals with a subject of great interest to American manufacturers who are concerned with foreign trade.

Pointers for Obtaining Business

In addition to outlining the possibilities of selling American cars and tractors there are practical pointers on methods of obtaining business and carrying it on successfully. Copies can be obtained at the purely nominal price of 5 cents from the Superintendent of Documents, Government Printing Office, Washington, D. C., or from any district or co-operative office of the Bureau of Foreign and Domestic Commerce.

To Manufacture Airplanes and Conduct Flying School

LOUISVILLE, KY., Dec. 3—The Darling Air Craft Co. has filed articles of incorporation to manufacture airplanes and to conduct a school for flying instruction. The capital stock of the company, which will have its principal offices and place of business in Louisville, is $25,000. Omar F. Darling is president and Henry T. Kraft, secretary.

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DETROIT, Dec. 3—The Pronvost Wheel Co. has filed articles of incorporation calling for a capital stock of $40,000. The term of capitalization is 30 years; $4,000 of the stock is paid in in cash, the price per share being $100. The shareholders are: Jos. Pronvost, 198 shares; Floyd Warner, one share, and J. W. Biddle, forty shares.

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CINCINNATI, OHIO, Dec. 1—The Rapid Cooler Auto Radiator Co., has been incoporated with a capital of $60,000 to manufacture automobile radiators. The incorporators are C. M. Bechtel, E. J. Geske, J. Vernon Shaw, Joseph N. Brown and J. B. Towler.

New Companies Formed

Latest additions to ranks of Automotive Industries

APPLETON, WIS., Dec. 2—The Eagle Mfg. Co. has increased its capital stock from $200,000 to $500,000. It manufactures farm machinery and tractors. Frank Saiberlich is president.

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MILWAUKEE, WIS., Dec. 2—The Hercules Motor Truck Co. has been incorporated under Wisconsin laws with a capital of $100,000. The incorporators are Lynn S. Pease, Walter F. Mayer and E. L. Koepke.

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DETROIT, Dec. 1—The American Machine Products Co. has organized with a capital stock of $10,000 at $10 per share, of which $4,000 is paid in cash. Stockholders are: E. A. Munger, J. C. Cooke and Wm. H. Wetherbee.

Frankfort Co. Will Make New Type Carbureter

INDIANAPOLIS, Dec. 1—The Frankfort Carburetor Company of Frankfort, Ind., has been incorporated with a capitalization of $250,000. The company will manufacture a new type of carbureter, but its definite plans as yet have not been made public. Directors are Milton T. McCarty; Richard D. Voorhees; William H. Frank; Frank E. Coulter, Carl W. Sims, William H. Spencer, and Eugene O. Durget.

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DETROIT, Dec. 2 — The Automatic Screw Machine Co. is incorporated with a capital stock of $25,000. The stock paid in in property, tools, etc., amounts to $25,000. The shareholders are Jos. Mailhot, Bertha Mailhot and Elwood L. Olney.

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DIVIDENDS DECLARED

Fisk Rubber Co., quarterly of 1¾ per cent on second preferred, payable Dec. 15 to stock of record Nov. 5.

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Continental Motors Corp., 2 per cent on common stock, payable Dec. 5 to stockholders of record Nov. 26.

License Used Car Dealers

DETROIT, Dec. 1—In the future all used car and accessory dealers must procure a license from the mayor and go on a bond for $2000 before being permitted to do business. This ordinance has been passed by the city council and goes into immediate effect. Car theft, tire and accessory theft have been constantly increasing in the past, and the effect of the ordinance will be to render a strict accounting of all used cars and merchandise possible by the police department. It is a part of the ordinance that the dealer's establishment must be in the city, and that the dealer be a man of good character to obtain a license.

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Mechanics Leaving Detroit

DETROIT, Dec. 1—Over 136 recruits for the mechanical repair unit have left this city in the past two days for eastern points, and immediate transportation to France. Many of these are mechanics from automobile plants, and others are from industrial plants. The slogan for enlistment was "Thanksgiving at home, Christmas in France."

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LOS ANGELES, Dec. 3—Four local track records were broken in the final motor car races of the year at Asquith Park, Miles Speedway, Thansgiving. Eddie Hearne won the 50-mile in a field of six starters in 41:54 4/5; average, 71.5 m.p.h. Louis Chevrolet, with a handicap of 856 ft., won the 10-mile in 7:51; average, 75.5 m.p.h. Other handicaps were: Durant, 1800 ft.; Milton, 428; Hearne, scratch. Hearne beat Milton by a car length. Tom Milton won the one-mile special with a flying start in 47 seconds, an average of 76.6 m.p.h. Durant and Chevrolet finished. Oldfield, in a special car, made a circuit of the track in 45 seconds, an average of 80 m.p.h., breaking his own record by 1/5 of a second. Patterson, Pullen, Vail and Bolden, announced as entries, failed to show up.

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Close Claymont Aviation School

WILMINGTON, DEL., Dec. 1—After having turned out 25 aviators for the government, the Delaware School of Aviation, at Claymont, has closed for the season. Whether it will reopen in the spring has not been determined, but it is thought that it will not.

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Kerosene Tractors from Peoria

PORT HURON, Dec. 3—The Port Huron Mfg. Co. has purchased a large tract of land at the end of Sanger Street, Peoria, Ill., and will at once commence the erection of a kerosene tractor manufacturing plant. The first building to be erected will be of brick and 300 ft. in length.

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Huron Moving to Peoria

PEORIA, ILL., Dec. 3—The Huron Tractor Co., a subsidiary of the American Tractor Corp., has leased 12 acres at the foot of Sanger Street. The lease is for 18 months with the privilege of purchase. The company will remove its factory and material from Chicago and begin assembling at once. The company has large contracts with the French Government.

Peoria to Build 2000 Tractors a Year

PEORIA, Dec. 3—The Peoria Tractor Co. has been reorganized and the capital stock increased to $1,500,000. The plant at East Peoria will be enlarged in order to permit the construction of 2000 vehicles per annum. An order for 300 tractors has just been secured from the British government.

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Double Holt Capacity

PEORIA, Dec. 3—The Holt Tractor Co. has commenced the erection of a building which will enable it to double its output of caterpillar tractors. The new structure will be ready by Jan. 1.

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Sue Enricht Over His Fuel

NEW YORK, Dec. 3—The gasoline substitute of Louis Enricht, which achieved considerable publicity several months ago, is again in the limelight. Enricht is being sued by the National Motor Power Co., which wishes to restrain him from disposing of the secret formula. It is charged that he offered to sell it to Germany for $1,500,000. Enricht denies any unpatriotic action or intent.

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Community Tractors to Help Labor Shortage

HARRISBURG, PA., Nov. 27—The Secretary of Agriculture, Chas. E. Patton, has suggested the use of community tractors as a means of overcoming the labor shortage in farm work. He recommends that all chambers of commerce and similar organizations immediately take steps to secure tractors, and during the winter plan schedules whereby farmers in each section can have their work done, even to the extent of working day and night.

Republic May Have Coast Plant

DETROIT, Dec. 3—The Republic Motor Truck Co., Alma, Mich., is reported to be considering the erection of an assembling plant in San Francisco. It recently paid $125,000 for property in Los Angeles for a similar purpose.

Quick Work by Continental

DETROIT, Dec. 1—The Continental Motors Corp. required only 16 days, 20 hours and 50 minutes from the time the Class A engine drawings were started to the time that the first engine was running, as compared with the 16 weeks ordinarily required in peace times.

New Boone Plant to Be Ready Jan. 1

CHIPPEWA FALLS, WIS., Dec. 3—The new branch factory of the Boone Rubber & Tire Co., Sycamore, Ill., which has been under construction at Chippewa Falls, Wis., for several months, is expected to be ready to begin operations immediately after Christmas, according to announcement made by I. V. McLain, president and general manager. Machinery and equipment are being installed in the main factory and work on the power plant is progressing rapidly. The company has consolidated its sales departments and opened offices in the First National Bank Building, Chicago.

Eagle Increases Directorate

APPLETON, WIS., Dec. 3—The Eagle Mfg. Co., Appleton, Wis., which recently increased its capital stock from $200,000 to $500,000 and is building a large addition, 120 by 120 ft., to its farm tractor plant, has enlarged its board of directors to accommodate new capital. The new officers and directors are: President, Frank Saiberlich; vice-president, Oscar Saiberlich; secretary and treasurer, Edward Saiberlich; general manager, Charles H. Hagen; directors, A. W. Priest, Fred Peterson and A. H. Meyer.

Stegeman Becomes Hercules

MILWAUKEE, Dec. 3—Although the reorganization of the Stegeman Motor Car Co., 606 Linus Street, Milwaukee, has not been fully completed, it has become known that the business has been reincorporated under the name of Hercules Motor Truck Co., with a capital stock of $100,000, and the manufacture of six-cylinder worm-drive trucks will be continued as before. Oscar Stegeman, president, retired several weeks ago. Arthur Davidson of the Harley-Davidson Motor Co., Milwaukee, has held a large financial interest for some time past and will take an active part in the management.

Calendar

ASSOCIATIONS

1918

Jan. 3-4—New York Automotive Electric Assn. meeting.

Jan. 7-8—New York, National Automobile Dealers' Assn. directors' meeting with vice-presidents from Eastern States.

SHOWS

1917

Dec. 5-15 — Toledo, National Farmers' Exhibition at Terminal Auditorium.

1918

January — Kalamazoo, Mich., Kalamazoo Automobile Dealers' Assn., Armory.

Jan. 2-9—New York, Salon. Automobile Salon, Inc., Astor Ballroom. John R. Eustis, Mgr.

Jan. 5-12 — New York Show, Grand Central Palace, National Automobile Chamber of Commerce.

Jan. 11-19 — Philadelphia, 17th Annual Show, Philadelphia Auto Trade Assn., Commercial Museum Bldg.

Jan. 11-19—Providence, R. I., R. I. Licensed Auto. Dealers' Assn., State Armory. Percival S. Clark, Mgr.

Jan. 14-19—Rochester, N. Y., Tenth Annual Exposition Park. C. A. Simmons, Mgr.

Jan. 16-27 — Milwaukee, Wis., Milwaukee Automobile Dealers, Inc., Auditorium. (First 7 days, passenger cars; last 3 days, commercial cars.) Bart J. Huddle, Mgr.

Jan. 19-26—Detroit Automobile Dealers' Assn., Overland Bldg. H. H. Shuart, Mgr.

Jan. 19-26 — New York Motor Boat Show, Grand Central Palace, National Assn. of Engine and Boat Manufacturers.

Jan. 19-26—Detroit, Willis Avenue Overland Service Station.

Jan. 19-27 — Cleveland, Seventeenth Annual, Cleveland Automobile Show Co., Wigmore Coliseum. Fred. H. Caley, Mgr.

Jan. 19-28—Montreal, Can., Montreal Automobile Trade Assn., Ltd., Almy Bldg. T. C. Kirby, Mgr.

Jan. 21-26—Manchester, N. H., Academy. Couture Bros.,

Jan. 21-26—Scranton, Pa., Scranton Motor Trades Assn., Armory. Hugh B. Andrews, Mgr.

Jan. 21-26—York, Pa., Queen Street Tabernacle, York Automobile Dealers' Assn.

Jan. 21-26 — Wilmington, Del., Hotel Du Pont.

Jan. 23-28—Allentown, Pa., Lehigh Auto. Trade Assn., Traylor Motor Co.'s Garage. P. W. Leisering, Publicity Mgr.

Jan. 26-Feb. 2 — Chicago National Show, Coliseum and Armory, National Automobile Chamber of Commerce.

Jan. 26-Feb. 2—Chicago, Salon, Elizabeth Room of Congress Hotel.

Jan. 26-Feb. 2—Harrisburg Pa., Capital City Motor Dealers' Assn. J. Clyde Myton, Mgr.

Jan. 28-Feb. 2—Buffalo, N. Y., Buffalo Automobile Dealers' Assn., Broadway Auditorium.

Jan. 26-Feb. 2—Bridgeton, N. J., Bridgeton Auto Dealers' Assn. O. P. Riley, Sec.

February — Greensburg, Pa., Westmoreland Automobile Dealers' Association.

February — Peoria, Ill., Peoria Auto and Accessories Dealers' Assn. W. O. Ireland, Mgr.

Feb. 9-16—Bronx, N. Y., 2d Battery Armory, Bronx Automobile Dealers' Assn. D. J. Barrett, Mgr.

Feb. 11—Toledo, Terminal Auditorium, Toledo Auto Show Co.

Feb. 11-16—St. Louis, Mo., St. Louis Auto Mfrs. & Dealers' Assn. Robert E. Lee, Mgr.

Feb. 11-16—Kansas City, Mo., Third Annual National Tractor Show.

Feb. 16-23—New York, Second Pan-American Aeronautic Exposition, Grand Central Palace and Madison Square Garden.

Feb. 16-24—San Francisco, Cal., San Francisco Dealers' Assn., Exposition Auditorium. G. A. Wahlgreen, Mgr.

Feb. 18-23—Grand Rapids, Mich., Automobile Business Assn., Klingman Building. Ernest T. Conlon, Mgr.

Feb. 18-23—Newark, N. J., N. J. Auto Exhibition, Co. G. First Regiment Armory. Claude E. Holgate, Mgr.

Feb. 18-23—Des Moines, Ia., Des Moines Automobile Dealers' Assn., Coliseum. C. G. Van Vliet & Dean Schooler, Mgrs.

Feb. 18-23 — Springfield, Ohio, Springfield Auto Trades Assn., Memorial Hall. C. S. Burke, Mgr.

Feb. 18-23 — Waterbury Conn., United Shows Co.

Feb. 18-24—Des Moines, Ia., Second Annual Truck, Auditorium. Dean Schooler & C. G. Van Vliet, Mgrs.

Feb. 18-25 — Pittsfield, Mass., State Guard, State Armory. James J. Callaghan, Mgr.

Feb. 18-27—So. Bethlehem, Pa., Fourth Annual (cars 18-23; trucks 25-27), Coliseum. J. L. Elliott, Mgr.

Feb. 22-Mar. 9—Brooklyn, N. Y., Brooklyn Motor Vehicle Dealers' Assn., Twenty-third Regiment Armory. I. C. Kirkham, Treas.

Feb. 25 - Mar. 2 — Bridgeport, Conn., Fourth Regiment Conn. Home Guard, State Armory & Casino. B. B. Steiber, Mgr.

Feb. 27-Mar. 6 — Boston, Mass., Salon, Boston Automobile Dealers' Assn., Copley Plaza Hotel. Chester I. Campbell, Mgr.

Mar. 1—Lyons, France, Third Sample Fair.

Mar. 2-9—Pittsburgh, Pa., Automobile Dealers' Assn. of Pittsburgh, Motor Square Garden. John J. Bell, Mgr.

Mar. 19-24—San Francisco, Cal., Motor Truck Dealers of San Francisco, Auditorium. Ivan R. Gates.

Mar. 19-24 — Cedar Rapids, Ia., Cedar Rapids Auto Trade Assn., Auditorium.

Apr. 9-13—Stockton, Cal., San Joaquin Auto Trade Assn. Samuel S. Cohn, Mgr.

Sept. 23-28 — Chicago, National Accessory Show for Fords, Coliseum.

S. A. E.

Jan. 10—New York, Automotive Dinner at Hotel Biltmore.

Feb. 1—Chicago, War Dinner during Winter Meeting.

Engineering

American Railway Master Mechanics' Assn.
American Institute of Electrical Engineers.
Master Builders' Assn.
American Society of Heating and Ventilating Engineers.
Association Iron and Steel Electrical Engineers.
Mining and Metallurgical Society of America.
Society of Automotive Engineers.
Illuminating Engineering Society.
National Electric Light Assn.
National Gas Engine Assn.
American Society for Testing Materials.
American Institute of Metals.
American Foundrymen's Assn.
Society Naval Architecture and Marine Engineers.

DECEMBER

8—Assn. Iron & Steel Elec. Engrs. monthly meeting Cleveland section.

10—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Ill. section at Chicago.

11—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Mich. section at Detroit.

13—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Penn. section at Phila.

13—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Ohio section at Cleveland.

15—Assn. Iron & Steel Elec. Engrs. monthly meeting Pittsburgh section.

17—Amer. Soc. Heat. & Vent. Engrs. monthly meeting New York section.

20—Mining & Met. Soc. Amer. Monthly meeting New York section at Engrs. Club.